

AXEL Office Server AX4000

Communication Server
4 and 8 serial ports

User's Manual

The reproduction of this material, in part or whole, is strictly prohibited. For additional information, please contact:

AXEL

14 Avenue du Québec
Bât. K2 EVOLIC - BP 728
91962 Courtabœuf cedex - FRANCE
Tel.: 33 1.69.28.27.27
Fax: 33 1.69.28.82.04
Email: info@axel.com

The information in this document is subject to change without notice. AXEL accepts no responsibility for any errors that may occur in this document.

All trademarks and registered trademarks are the property of their respective holders.

© - 1998-2002 - Axel - All Rights Reserved.

INTRODUCTION	1
1 - PRESENTATION.....	5
1.1 - REAR PANEL AND FRONT PANEL	6
1.2 - MAIN FEATURES	7
1.3 - EXAMPLE CONFIGURATION.....	8
2 - SETTING-UP THE OFFICE SERVER IN INTERACTIVE MODE.....	11
2.1 - ENTERING SET-UP	12
2.1.1 - <i>From a Serial Character Terminal</i>	12
2.1.2 - <i>From a telnet Session</i>	13
2.2 - SET-UP OVERVIEW.....	14
2.2.1 - <i>Navigation</i>	14
2.2.2 - <i>Entering Values</i>	14
2.2.3 - <i>Special Notation</i>	15
2.2.4 - <i>Set-Up Tree</i>	15
2.2.5 - <i>Exiting Set-up Mode</i>	16
2.3 - NETWORK SET-UP.....	16
2.3.1 - <i>Office Server Network Interface</i>	16
2.3.2 - <i>Host Table</i>	17
2.3.3 - <i>Router Table</i>	17
2.4 - SETTING UP THE SERIAL PORTS	18
2.4.1 - <i>Line Parameters</i>	18
2.4.2 - <i>Duplicating Serial Line Settings</i>	20
2.5 - SERIAL LINE USING	21
2.5.1 - <i>Connecting a Printer</i>	22
2.5.2 - <i>Connecting a Dumb Terminal</i>	24
2.5.3 - <i>Connecting other Devices on Unix</i>	25
2.5.4 - <i>Any Devices on Windows</i>	27
2.5.5 - <i>Providing LAN Access to a Non-TCP/IP System</i>	28
2.5.6 - <i>TCP/IP↔RS232 Converter</i>	29
2.6 - BACKUP HOST	29
2.7 - SECURITY ISSUES.....	30
2.7.1 - <i>Password</i>	30
2.7.2 - <i>Changing the Set-Up TCP Port</i>	30
2.7.3 - <i>Changing the Office Server IP Address</i>	31

3 - TOOLS AND STATISTICS.....	33
3.1 - PING.....	34
3.2 - REBOOTING THE OFFICE SERVER	34
3.3 - RESETTNG A SERIAL LINE	35
3.4 - CONNECTION MANAGEMENT	35
3.5 - STATISTICS.....	36
3.5.1 - <i>Network Statistics</i>	37
3.5.2 - <i>Serial Line Statistics</i>	39
4 - USING A SCRIPT TO SET-UP THE OFFICE SERVER.....	41
4.1 - OVERVIEW	42
4.2 - SETTING-UP AN OFFICE SERVER	43
4.3 - OBTAINING A CONFIGURATION.....	44
4.4 - ERROR MESSAGES	44
5 - DOWNLOADING FIRMWARE.....	51
5.1 - OVERVIEW	52
5.1.1 - <i>Downloading Protocols</i>	52
5.1.2 - <i>Suitable Settings</i>	52
5.1.3 - <i>Firmware File Characteristics</i>	53
5.2 - DOWNLOADING BY TFTP PROTOCOL	54
5.2.1 - <i>By a rsh Command</i>	54
5.2.2 - <i>From the Interactive Set-Up</i>	55
5.3 - DOWNLOADING BY BOOTP AND TFTP PROTOCOLS.....	55
5.3.1 - <i>By a rsh Command</i>	57
5.3.2 - <i>From the Interactive Set-Up</i>	57
5.4 - DOWNLOAD PROCESSING	58
APPENDIX.....	59
A.1 - NETWORK OVERVIEW	60
A.1.1 - <i>Ethernet Addresses</i>	60
A.1.2 - <i>IP Address</i>	61
A.1.3 - <i>Routers</i>	61
A.2 - LPD PRINTERS.....	64
A.2.1 - <i>UNIX</i>	65
A.2.2 - <i>Windows</i>	66
A.2.3 - <i>OS/400</i>	67

A.3 – UNIX/LINUX AXEL TTY SERVER.....	68
A.3.1 - Introduction	68
A.3.2 - Installing an AXEL tty server.....	69
A.3.3 - Using an AXEL tty server.....	70
A.3.4 -The axttyd Mechanism.....	71
A.3.5 - Uninstalling.....	71
A.4 - VIRTUAL COMS ON WINDOWS.....	72
A.4.1 - Setting-Up the Office Server.....	72
A.4.2 - Installing the DialOut/IP Driver.....	72
A.4.3 - Adding Virtual COMs	73
A.4.4 - Using a Virtual COM	76
A.5 - MANAGING LOCALLY A MODEM.....	76
A.5.1 - Dial-In or Dial-Out	76
A.5.2 - Modem Rules.....	76
A.5.3 - Modem Flow Chart.....	78
A.5.4 - Setting-Up the Modem	79
A.6 – USING ETHERNET ADDRESS TO SET UP IP ADDRESS	79
A.6.1 – If the Office Server IP Address is not Valid.....	79
A.6.2 – If the Office Server IP Address is Unknown.....	82
A.7 - CONFIGURATION SCRIPT FORMAT	82
Header.....	84
Ethernet Parameters.....	84
TCP/IP Parameters.....	85
Serial Port Parameters	86
Tunings.....	88
End of File.....	88
A.8 - KEEPALIVE FUNCTION	89
A.8.1 - Why a Keepalive Function is Needed?.....	89
A.8.2 - Example of Potential Issue	89
A.8.3 - Keepalive Mechanism.....	89
A.8.4 - Enabling the Keepalive	90
A.8.5 - When Routers are Used	90
A.9 - OFFICE SERVER LED MEANINGS	91
A.9.1 - Standard Processing.....	92
A.9.2 - Specific Processing.....	92
A.9.3 - Errors	92
A.10 - ADMINISTRATION COMMAND LIST	94

INTRODUCTION

This manual provides the information needed to operate and maintain the Office Server.

The manual is organised into the following chapters and appendices:

Chapter 1: Presentation

Description of the front and rear panels of the Office Server and introduction to the main features.

Chapter 2: Setting up the Office Server in interactive mode.

Description of the embedded interactive set-up (accessed from a serial terminal or a telnet session). This interactive set-up allows the serial line parameters (data transfer rate, handshake, etc.) and the associated network services (telnet, lpd, etc.) to be set.

Chapter 3: Tools and statistics

Description of the embedded Office Server tools (ping, serial line reset, statistics, etc.).

Chapter 4: Setting up the Office Server by using a script

The Office Server settings can be stored in a script (a text file). This script can be used to set-up one or more Office Servers.

Chapter 5: Firmware downloading

How to download the Office Server firmware by using the tftp and bootp protocols.

Appendices:

The following appendices give more detailed information:

- A.1 - Network overview (Ethernet address, IP address and routers)
- A.2 - Adding a LPD printer on an operating system
- A.3 - Installing the AXEL tty server on UNIX
- A.4 - Virtual COMs on Windows
- A.5 - Managing locally a modem
- A.6 - Giving the Office Server IP address by the Ethernet address
- A.7 - Office Server configuration script
- A.8 - Keepalive Function
- A.9 - Description of the Office Server leds
- A.10 - Administration command list

CHAPTER 1

PRESENTATION

This chapter provides a description of the front and the rear panels of the Office Server and introduces you to its main features.

The Office Server can be regarded as a gateway between network equipment (Ethernet TCP/IP) and RS-232 devices.

1.1 - REAR PANEL AND FRONT PANEL

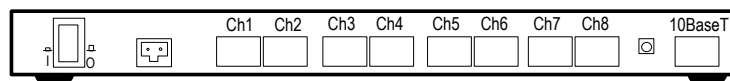
The Office Server has the following connectors and switches on the rear panel:

- 1 power switch,
- 1 connector for the external power transformer cord,
- 4 or 8 serial ports; RJ-45 (RS-232),
- 1 administrator switch to access the interactive set-up,
- 1 TCP/IP port, RJ-45 (10BaseT).

AX4010 Rear Panel



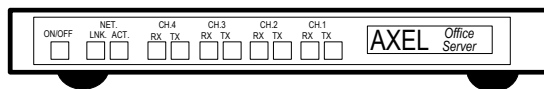
AX4020 Rear Panel



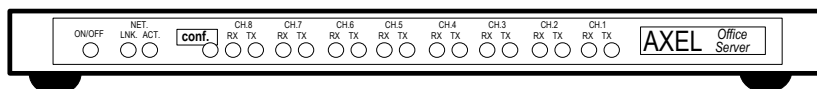
The following leds (light emitting diodes) are located on the front panel:

- ON/OFF: power indicator,
- LNK: good link indicator,
- ACT: network activity indicator,
- conf.: set-up indicator (according to the model,
- RX and TX: one per serial port, serial activity indicator.

AX4010 Front Panel



AX4020 Front Panel



These leds are also used to signal any special processing (firmware downloading, for example) or to provide error codes. For more information, see appendix A.9.

1.2 - MAIN FEATURES

The Office Server TCP/IP stack handles:

- 8 hosts simultaneously,
- a routing table,
- a sub-net mask.

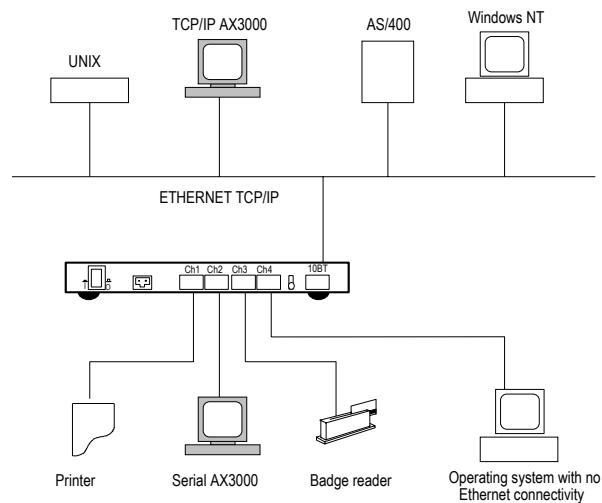
Main characteristics of serial ports:

- data transfer rate: from 300 bps (bits per second) to 115200 bps
- supported signals: Tx, Rx, DTR/DSR, RTS/CTS and DCD
- modem: locally handled (init script)

Available network services (associated with serial ports):

- telnet client: dedicated to serial terminals (user-defined telnet port)
- lpd and rcmd: dedicated to printers (user-defined identifier)
- tty client: to handle bi-directional peripherals (bar code readers, scanners, scales, etc.) via a UNIX device (pseudo-terminal).
- telnet server: two possible uses:
 - full control of port signals (RFC 2217) by using dedicated drivers according to the operating system.
 - giving LAN access to systems with no Ethernet connectivity.
- tty server: to handle bi-directional peripherals via a socket or a UNIX device (pseudo-terminal).

1.3 - EXAMPLE CONFIGURATION



The Ch1 port is associated with the **lpd service**. The printer is seen as a system printer by UNIX, AS/400 and NT (all users of these Operating Systems can access this printer).

The Ch2 port is associated with the **telnet client service**. The serial terminal is automatically connected to whichever host is selected on the Office Server Set-Up.

The Ch3 port is associated with the **tty client service**. The badge reader in this example would be handled by UNIX via a pseudo-terminal. It would be seen by an application just like a badge reader directly connected via a local serial port.

The Ch4 port is associated with the **telnet server**. The AXEL TCP/IP AX3000 can open a PICK session at the same time as opening open telnet sessions on other multi-user operating systems.

CHAPTER 2

SETTING-UP THE OFFICE SERVER IN INTERACTIVE MODE

This chapter deals with the Office Server interactive set-up.

The Office Server provides an embedded interactive set-up. This interactive set-up allows the network environment (IP address, host table, etc.), the serial line parameters (data transfer rate, handshake, etc.), and the network services associated with the serial lines (telnet, lpd, etc.), to be set.

2.1 - ENTERING SET-UP

The Office Server Set-Up can be entered from:

- a serial character terminal connected to the Office Server admin port,
- a telnet session launched from any network point.

2.1.1 - From a Serial Character Terminal

Plug a character terminal into the Office Server admin port (this is the Ch4 port with an AX4010 and the Ch8 port with an AX4020).

Set up the main port of this terminal in the following way:

- data transfer rate: 9600 bps
- data: 8 bits
- stop bit: 1
- parity: none
- handshake: none
- keyboard: ASCII mode

Note: any emulation or personality can be used.

An administrator switch is located on the Office Server rear panel. To enable set-up mode press then release this switch.

The set-up main menu is displayed on the character terminal.

The following section describes the use of set-up mode.

When the set-up session has been completed, the admin port can be used for other network services.

Note: during set-up mode, the two leds of the admin port remain lit. For the AX4020, the "conf." led is also lit.

2.1.2 - From a telnet Session

To run set-up within a telnet session, the IP address of the Office Server must already be set. This can be done either:

- through a serial terminal, plugged into the admin port (see chapter 2.1.1),
or
- by specific embedded protocols, using the Ethernet address (see appendix A.6).

Run the telnet session from any network host. **Use 4096 as the telnet port.** For example: under UNIX (where *name* is the Office Server hostname):

```
$ telnet name 4096 <CR>
```

The set-up main menu will then display on the console.

The following section describes the use of set-up mode.

When the set-up session has been completed, the Office Server automatically terminates the telnet session.

2.2 - SET-UP OVERVIEW

The Office Server set-up interface provides menus and sub-menus. Its number may select each menu item. A menu item may either lead to a sub-menu or run a command.

2.2.1 - Navigation

To select a menu item, enter the item number and press <CR> (Carriage Return Key).

To go back to the previous menu, enter <q> then <CR>.

To go back to the main menu, enter <Q> then <CR>.

2.2.2 - Entering Values

To change a set-up parameter value, enter the new value then press <CR> (pressing <CR> without entering a value keeps the current value).

To enter ASCII codes lower than 20 hexadecimal, enter '\ ' then the hexadecimal ASCII code. For example, '\1Bz' encodes 'Esc z'.

Useful tips:

- permitted parameter values are displayed between '<' and '>'. These may be either a (comma-separated) list of correct values or the max. and min. values.
- the current value of the parameter is displayed between brackets ([xxx]).

Examples:

<pre>Data transfer Rate <300 -> 115200> [38400]: Service <telnet, tty, lpdrcmd> [telnet]:</pre>
--

2.2.3 - Special Notation

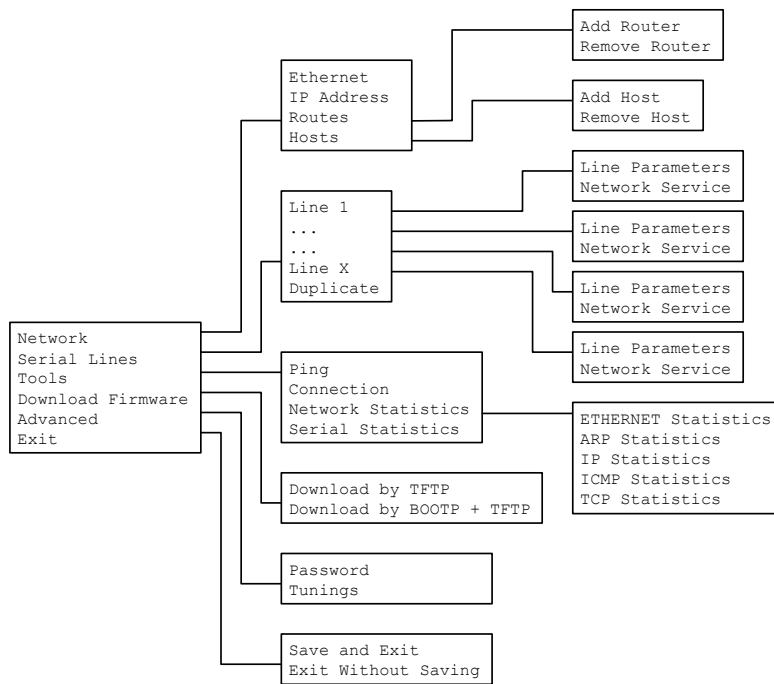
The set-up is a sequence of menus and sub-menus. Define an action by the path followed through the set-up tree (hierarchy), using the following notation:

[command1]→[command2]→[action]

For example, to perform the above **action**, select **command1** in the main menu, then select **command2** in the sub-menu.

2.2.4 - Set-Up Tree

The full set-up tree is as follows:



2.2.5 - Exiting Set-up Mode

To save the modifications and exit set-up mode, select **[Exit]→[Save and exit]**. The Office Server settings are stored in NVRAM and the set-up session is ended.

Note: to abandon your changes and exit set-up mode, select **[Exit]→[Exit without Saving]**.

2.3 - NETWORK SET-UP

The **[Network]** menu allows the administrator:

- to configure the Office Server network interface (name, IP address and netmask),
- to enter data into the host table (name and IP address),
- to enter data into the routing table.

Note: for more information on IP addresses and routers, consult appendix A.1.

2.3.1 - Office Server Network Interface

Select **[Network]→[IP Address]** and enter the following parameters:

- **Name:** this is only a local name (not available to a DNS server),
- **IP address,**
- **Netmask:** the value used depends on the IP address class (A, B or C). Modify this mask to correspond to the type of sub-net used.

Note: select the menu **[Network]→[Ethernet]** to ascertain the Ethernet address.

2.3.2 - Host Table

A host is any machine equipped with an Ethernet interface (UNIX, AS/400, NT, etc):

- the Office Server can open TCP/IP connections to a host (telnet client and tty client),
- a host can open TCP/IP connections to the Office Server (lpd/rcmd, telnet server and tty server)

To add a new host, select **[Network]→[Hosts]→[Add Host]** and enter the following parameters:

- **Name**: this is only a local name (not available to a DNS server),
- **IP address**.

To remove a host from the table, select **[Network]→[Hosts]→[Remove Host]** and enter the host number.

2.3.3 - Router Table

A router is a special device that acts as a gateway between two LANs. You can define:

- one router per remote network,
- one default router which provides routing information to the remote networks.

For more information, see appendix A.1.

To add a new router, select **[Network]→[Routers]→[Add Router]** and enter the following parameters:

- **Route IP address**: the IP address of the router,
- **Dest. IP address**: the IP address of the destination or the **command option** 'default' to set a default router,
- **type**: if the destination is a network (type=net), the default netmask of the class (A, B or C) is applied to **Dest. IP Address**. Else (type=host), this IP address is not modified.

To remove a host from the table, select **[Network]→[Routers]→[Remove Router]** and enter the host number.

2.4 - SETTING UP THE SERIAL PORTS

The **[Serial]** menu allows an administrator:

- to set line parameters (data transfer rate, handshake, etc.) for the serial ports,
- to associate a network service with each serial port (telnet, lpd, etc.).

2.4.1 - Line Parameters

To modify the line parameters of port X, select **[Serial Lines]→[Line X]→[Line Parameters]**. The first parameter is:

Line Type: three values are available:

- direct: for a direct connection
- dedicated: for a dedicated (or leased) line
- telecom: for a voice modem or an ISDN adaptor.

Note about modem control

The 'dedicated' and 'telecom' types make the modem invisible for the operating system. This is very interesting when a dumb terminal is connected via modem because the operating system 'sees' a dumb terminal directly connected (see Appendix A.5).

In the opposite case, if the modem must be controlled by the operating system (ex: fax software), set the 'direct' type and use the proper network service (server telnet with the RFC 2217 extension).

The following parameters depend on the LINE TYPE value.

Parameters needed for all three types of lines (direct, dedicated and telecom):

- **Data Transfer Rate:** speed in bps
Values: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
- **Data Format:** size of data, number of stop bits and parity. A slash (/) is used to separate the 3 values.
Size of data: 7 or 8 bits
Stop bits: 1 or 2 bits
Parity: none, even or odd
Example: 8/1/none.
- **TX FIFO Size:** size of the internal buffer allocated for data flow control (from 1 to 16 bytes).
- **Input Flow Cntl:** handshake used by the Office Server to control the peripheral's data flow.
Values: none, xon, xpc, rts or dtr.
- **Flow Cntl Chars Passthru :** if yes (y), when a software handshake is used by the peripheral, the handshake control characters (xon/xoff and xpc) are both locally processed and sent over the network. if no (n), the handshake control characters are only locally processed.
- **Output Flow Cntl:** handshake used by the peripheral to control the Office Server's data flow.
Values: none, xon, xpc, cts or dsr.
- **Peripheral Presence Signal:** signal used by the Office Server to detect the peripheral's presence. The possible values depend on the LINE TYPE value:
 - Direct line: none, cts or dsr.
 - Modem or dedicated line: cts, dsr or soft. The 'soft' value allows detection of the modem's presence. Type in 'AT<CR>' to which the modem should answer 'OK'.
- **Net Close on Pres. Lost** (requested only if Line Type is direct and Peripheral Presence is enabled): if yes (y), the network service is closed when the peripheral presence signal is dropped. If no (n), the network session is not closed when the peripheral presence signal is dropped.

Parameters needed for a modem or dedicated line:

- **Hang-Up Type:** signal used by the Office Server to terminate the call.
Values: soft, rts or dtr.
- **Modem Esc.** (requested only if HANG-UP TYPE is soft): HAYES sequence to return to command mode.
- **Modem Hang-Up Seq.** (requested only if HANG-UP TYPE is soft): HAYES sequence to terminate the call.
- **Hang-Up on Net Close:** if yes (y), the Office Server terminates the call when the network connection is closed. If no (n), the modem does not hang up when the network session is closed.
- **Net Close on Hang-Up:** if yes (y), the network service is closed when the modem hangs up. If no (n), the network session is not closed when the modem line is dropped.
- **Line Inactivity Timeout:** If the line is inactive for a predefined number of minutes, the Office Server automatically terminates the call (HANG-UP TYPE). If the number of minutes is '0', this feature is disabled.
For safety reasons, please enable this feature at the modem level by using the proper HAYES sequence.
- **Modem Reset Seq.:** HAYES sequence to reset the modem (factory set-up).
- **Modem Init Seq.:** HAYES sequence to initialise the modem.
- **Phone Seq.** (not available for a dedicated line): phone number of the remote site (used when the Office Server dials the modem).

For more information about using modems, see appendix A.5.

2.4.2 - Duplicating Serial Line Settings

The Office Server allows duplication of a given serial line configuration. Select **[Serial Lines]→[Duplicate]** and enter the following parameters:

- **source:** number of the source serial line
- **destination:** four values are available:
 - a serial line number,
 - a comma separated list of serial line numbers (e.g.: 1,3,4),
 - a range of serial line numbers (e.g.: 2-4),
 - the command option **'all'**.

After confirmation, the line settings (line parameters, modem settings and network service) are copied onto the target serial line(s).

The new serial line settings are effective:

- when the Office Server is rebooted,
- the next time the associated network service opens a connection,
- when the serial line is reset.

2.5 - SERIAL LINE USING

The Office Server offers many network services. The suitable network service depends on:

- the used device (printer, dumb terminal, modem...)
- and the operating system (Unix, AS/400, NT...)

Note about network services:

- type **server** (telnet, tty, lpd or rcmd): the Office Server accepts connections from network hosts,
- type **client** (telnet or tty): the Office Server opens connections to network hosts.

Tables below list for each operating system, the network services and associated software according to the connected device.

Printer

	Office Server	Additional Software	See Chapter...
Unix	server lpdrcmd	---	2.5.1
	client/server tty	axttyd	2.5.3
AS/400	server lpdrcmd	---	2.5.1
Windows 95/98	server telnet	DialOut/IP	2.5.4
Windows NT	server lpdrcmd	---	2.5.1
	server telnet	DialOut/IP	2.5.4

Dumb Terminal

	Office Server	Additional Software	See Chapter...
Unix	client telnet	---	2.5.2
	client tty	axttyd	2.5.3
AS/400	client telnet	---	2.5.2

Modem

	Office Server	Additional Software	See Chapter...
Unix	client/server tty	axttyd	2.5.3
Windows 95/98	server telnet	DialOut/IP	2.5.4
Windows NT	server telnet	DialOut/IP	2.5.4

Other devices

	Office Server	Additional Software	See Chapter...
Unix	client/server tty	axttyd	2.5.3
Windows 95/98	server telnet	DialOut/IP	2.5.4
Windows NT	server telnet	DialOut/IP	2.5.4

The next chapters describe the needed procedure according to the connected device.

2.5.1 - Connecting a Printer

Two network services can be used to handle a printing:

- lpd: a LPD printer is used as a standard system printer (through the spooler).
- rsh (or rcmd): this service allows data to be sent to the printer by using a standard system command.

a - Setting the LPD or RCMD Service

The first step is to set the line parameters of the serial line used by the Office Server as described in chapter 2.4.

Then, the LPD/RCMD service must be configured for the Office Server serial port. Select **[Serial Lines]→[Line X]→[Network Service]** and enter the following parameters:

- **Service Mode:** enter the keyword 'server',
- **Service Type:** enter the keyword 'lpdrcmd' (a lpd port can also be accessed by a rsh/rcmd command),
- **Queue Name:** the name of the serial port. Each LPD port on the Office Server must have a separate name.
- **LPD before Print Seq.** (this parameter and the next ones are only used for a LPD printing): character string sent before the printing.
Sequence characteristics:
 - maximum length: 18 bytes
 - ASCII codes lower than 20 hexadecimal are encoded by using a backslash ('\') before the hexadecimal value (ex: '\1Bz' is 'Esc z').
- **LPD after Print Seq.:** character string sent at the end of the printing. Same characteristics than the previous parameter.
- **LPD NL to CRNL Conv.:** if yes (y), the line feed character (0x0A) is be mapped to carriage return + line feed (0x0D 0x0A).
- **TCP Keepalive Timeout:** the keepalive mechanism allows the Office Server to regularly check its TCP/IP connection status.
IMPORTANT: please, read appendix A.8 to set-up the keepalive mechanism and to understand consequences of the keepalive use (especially for routers).

b - Adding and Using a LPD Printer

The `lpd` utility allows **standard monitoring** of network printers.

At least two parameters are required to describe a LPD printer:

- the IP address for the Office Server,
- a queue name: the name of the serial port used by the Office Server.

For more information about how to add a LPD printer to your system, refer to appendix A.2.

The printer is used through a standard printing command (`lp` for example).

c - Using a RSH/RCMD Printer

The rsh (or rcmd) system command allows data to be sent to an Office Server serial port.

Example under Unix/Linux:

```
$ cat file | rsh axname portname <CR>
```

Note: **axname** is the name listed in /etc/hosts and **portname** is the name associated with the Office Server serial port through the Office Server Set-Up.

This command can be launched from any application or can be added to the printer script.

2.5.2 - Connecting a Dumb Terminal

The Office Server provides a **telnet client** network service. This service is dedicated to serial terminal management. The telnet server must be provided by the target operating system.

The first step is to set the line parameters of the serial line used by the Office Server, as described in chapter 2.4.

Then, the telnet client service must be configured for the Office Server serial port. Select **[Serial Lines]→[Line X]→[Network Service]** and enter the following parameters:

- **Service Mode**: enter the keyword 'client',
- **Service Type**: enter the keyword 'telnet',
- **TCP Port**: numeric value associated with the telnet service on the target host (generally 23),
- **Host Name / IP Address**: host name (or IP address) to which the serial terminal will be connected.
- **Terminal Type**: this character string is the value of the UNIX TERM environment variable,
- **Auto Connection**: two values:
 - 'y': a telnet session is automatically opened when the Office Server is powered or when the previous telnet session is closed,
 - 'n': a telnet session is opened when any key is pressed on the serial terminal.
- **Backup Host Used**: possible emergency host (see Chapter 2.6).
- **TCP Keepalive Timeout**: the keepalive mechanism allows the Office Server to regularly check its TCP/IP connection status.
IMPORTANT: please, read appendix A.8 to set-up the keepalive mechanism and to understand consequences of the keepalive use (especially for routers).

2.5.3 - Connecting other Devices on Unix

Note: if signal control (DTR/DSR, RTS/CTS or DCD) is needed, this device can be treated in the same way than a modem. So, the solution given on the next chapter is more suitable.

Two network services allow bi-directional communication with any peripheral:

- **tty client**: the Office Server opens a connection to the target host. This connection can be automatically generated when the Office Server is turned on or when any character is received at the Office Server serial port. This connection can be set to close if no characters are received within a specified time.
- **tty server**: the Office Server waits for a connection request from a host. This connection can only be closed by the host.

Note: the two tty services need a UNIX tty server from AXEL. This software (**axttyd**) is not available for operating systems other than UNIX. For more information, see appendix A.3.

The first step is to set the line parameters of the selected Office Server serial line, as described in chapter 2.4.

Set-up the Office Server according to the required tty service.

a - Client Tty

Select **[Serial Lines]→[Line X]→[Network Service]** and enter the following parameters:

- **Service Mode:** enter the keyword 'client',
 - **Service Type:** enter the keyword 'tty',
 - **TCP Port:** numeric value associated with the tty service on the selected UNIX host (generally 2048).
 - **Host Name / IP Address:** UNIX host name (or IP address) to which the serial peripheral will be connected.
 - **ID string:** the connection can be identified by a character string (Office Server IP Address<NULL> Port Name <NULL>):
 - 'y': the character string is automatically sent when the connection is established (before the data from the peripheral),
 - 'n': the character string is not used.
 - **Auto Connection:** two values:
 - 'y': a new tty session is automatically opened when the Office Server is powered up or when a previous tty session is closed,
 - 'n': the connection is opened when data is received.
 - **Time-out:** if the line is inactive for a predefined number of minutes, the Office Server automatically closes the connection. If the number of minutes is '0', this feature is disabled.
 - **Backup Host Used:** possible emergency host (see Chapter 2.6).
 - **TCP Keepalive Timeout:** the keepalive mechanism allows the Office Server to regularly check its TCP/IP connection status.
- IMPORTANT:** please, read appendix A.8 to set-up the keepalive mechanism and to understand consequences of the keepalive use (especially for routers).

Note: to use the axttyd Unix daemon, set the service as follow:

- ID string: y
- Auto Connection: yes
- time-out: 0

b - Server Tty

Select **[Serial Lines]→[Line X]→[Network Service]** and enter the following parameters:

- **Service Mode:** enter the keyword 'server',
- **Service Type:** enter the keyword 'tty',
- **TCP Port:** numeric value associated with this Office Server serial line.
- **TCP Keepalive Timeout:** the keepalive mechanism allows the Office Server to regularly check its TCP/IP connection status.
IMPORTANT: please, read appendix A.8 to set-up the keepalive mechanism and to understand consequences of the keepalive use (especially for routers).

2.5.4 - Any Devices on Windows

a) Presentation

The Office Server serial port can be controlled as standard operating system local COM ports. Any software can use standard O.S. commands to control these "virtual COMs":

- to send or receive data,
- to set serial line parameters (baud rate, parity, etc),
- to set serial output signals (DTR and RTS),
- to get serial input signals (DSR, CTS and CD).

IMPORTANT: the difference between virtual COMs and real COMs is the reaction time. Due to the network latency, delay can be observed between a serial port operating system operation and its achievement at the Office Server serial port level. And if software uses short timer, error processing could be reported with the virtual port.

This virtual COM control is based on a telnet protocol extension: RFC 2217 (RFCs can be consulted at <ftp://ftp.merit.edu/documents/rfc/>).

b) Setting the Office Server

To set the selected Office Server serial line, select **[Serial Lines]→[Line X]→[Line Parameters]** and enter the following parameters:

- **Line Type:** enter the keyword '**direct**' (even if a modem is connected to!),
- The other parameter values (**Baud Rate**, **Data Format**, etc) are not important. The software during the virtual port use will set them.

Then, select **[Serial Lines]→[Line X]→[Network Service]** and enter the following information:

- **Service Mode:** the keyword 'server',
- **Service Type:** the keyword 'telnet',
- **TCP port:** a numeric identifier. This identifier will be use by Windows to open this serial port
- **TCP Keepalive Timeout:** the keepalive mechanism allows the Office Server to regularly check its TCP/IP connection status.
IMPORTANT: please, read appendix A.8 to set-up the keepalive mechanism and to understand consequences of the keepalive use (especially for routers).

Note: generally, a unique TCP Port is associated with each Office Server serial port. But if a serial port polling is needed, use the same TCP Port number for each one.

At the Windows level a specific driver is needed: this driver is **DialOut/IP**, see Appendix A.4

2.5.5 - Providing LAN Access to a Non-TCP/IP System

The **telnet server** network service allows a TCP/IP terminal (for example a TCP/IP AXEL terminal) to open telnet sessions on a system with no Ethernet connectivity. The TCP/IP terminal then appears to this system as a serial terminal.

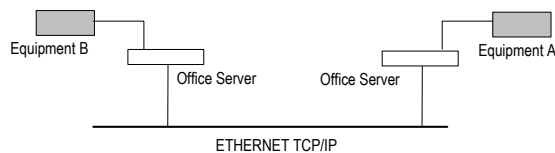
Set and associate the server telnet as described on the previous chapter.

To establish a connection, the TCP/IP terminal must open a telnet session into the Office Server. The Office Server's IP address and the TCP port of the Office Server serial line are given as arguments to the telnet command. For example:

```
telnet axname 2048 <CR>
```

2.5.6 - TCP/IP↔RS232 Converter

Two Office Servers can be used to link 2 devices through a network. This allows long distance connection.



The setting is very easy. A client service (telnet or tty) is needed on the first Office Server and a server service (telnet or tty) is needed on the second Office Server.

2.6 - BACKUP HOST

When a client service (tty or telnet) is used, a backup host can be set-up. A backup host is a secondary host that can be used when the primary host fails.

For tty and telnet client services, the last parameter is '**Backup Host Used**'.

Answer '**n**' to not use a backup host.

Answer '**y**' to set-up a backup host. The following parameters are asked:

- **Backup Host Name / IP Address:** name or IP address
- **TCP Port:** numeric value associated with the service.
- **Timeout to Enable Backup:** maximum delay allowed (in seconds) to open a connection to the primary host. If the connection fails, the Office Server opens a connection the backup host.
- **Backup Host Priority:** two answers:
 - '**n**': backup host has not priority. That means for each connection the Office Server try first to open a connection to the primary host (even if a previous primary host connection failed).
 - '**y**': backup host has priority. That means if a connection to the primary host fails, the backup host will be used for the further connection (until the Office Server is rebooted).

2.7 - SECURITY ISSUES

2.7.1 - Password

Select **[Advanced Set-Up]→[Password]**:

- to set a password
- to remove a password previously entered (left the password blank).

If the set-up is password-protected, the password is required when the set-up is entered (three tries are allowed).

IMPORTANT : if the password is forgotten, the super password '**yaka**' can be used.

2.7.2 - Changing the Set-Up TCP Port

The Office Server Set-Up can be run within a telnet session with the TCP port 4906.

This TCP port can be changed. Select **[Advanced Set-Up]→[Tunings]** and set the '**Setup tcp port**' parameter.

2.7.3 - Changing the Office Server IP Address

The Office Server IP address can be changed by using the arp and ping commands (see Appendix A.6.2).

This feature can be disabled by selecting **[Advanced Set-Up]→[Tunings]** and setting '**Ping change IP addr.**' to 'n'.

CHAPTER 3

TOOLS AND STATISTICS

This chapter describes the embedded Office Server tools (ping, serial line resetting, statistics, etc.).

3.1 - PING

The ping command is used to check for the presence of a live TPC/IP device. Failure of ping can indicate that the device has an incorrect IP address, is not powered up, etc.).

Select **[Tools]→[Ping]** menu and enter the IP address or the name of the TCP/IP peripheral.

After confirmation, ping requests are sent and either of two messages can be displayed:

- 'host is alive',
- 'host is down'.

3.2 - REBOOTING THE OFFICE SERVER

This feature has the same effect as power-cycling the server. You can reboot by a rsh command:

```
$ rsh axname ax_reboot password <CR>
```

Where:

- axname : AX4000 name (**/etc/hosts**) or IP address,

- ax_reboot : command for AX4000 reboot,
- password : specify the set-up password if set.

3.3 - RESETTING A SERIAL LINE

The serial line reset feature allows a line to be reset without rebooting the Office Server. This feature can be used:

- to stop and restart the associated network service
- to apply new serial line settings (data transfer rate, handshake, etc.).

Use the following rsh command to reset the Office Server serial line:

```
$ rsh axname ax_sinit password line <CR>
```

Where:

- axname : AX4000 name (**/etc/hosts**) or IP address,
- ax_reboot : command to reset the serial line,
- password : specify the set-up password if set,
- line : name of serial line (ex: ch1 or ch4).

The following message is displayed: 'OK, chx init'.

3.4 - CONNECTION MANAGEMENT

The **[Tools]→[connections]** menu item lists all current connections so that active connections may be manually closed if required.

This set-up screen displays the following information:

- **No**: connection number
- **Chan**: serial port number (from 1 to 4). An asterisk (*), displayed alongside this number, indicates that there is current connection via this port.
This arrangement can help prevent multiple connections (lpd for example) from attempting to use the same serial port. Should this occur, only one connection would be able to access the port, while the others would hang, waiting for the resource.
- **Type**: connection type (client or server) and service (telnet, tty, lpd)
- **State**: connection status (established, closed, etc.)
- **Local socket**: Office Server IP address and Office Server TCP port associated with this connection
- **Remote socket**: host IP address and host TCP port associated with this connection

Two actions are available:

- to close a connection: press <CR> then enter the connection number then press <CR> again.
- to exit this option: press <q> then <CR>

3.5 - STATISTICS

The Office Server monitors network and serial line performance from the time it is switched on. The logs record details of exchanged frames, rejected frames, etc.

Use a serial terminal or a telnet connection to access the interactive set-up (cf. Chapter 2.1).

3.5.1 - Network Statistics

To show network statistics, select **[Tools]→[Network Statistics]** then select the group you want to examine:

- Ethernet statistics
- ARP statistics
- IP statistics
- ICMP statistics
- TCP statistics

Once statistics are displayed, press <CR> to refresh the information or press <Q> to go back.

a - Ethernet Statistics

This option provides statistics relating to the embedded Office Server Ethernet controller:

- **intr**: number of interrupts received by the Office Server. Generally, one interrupt is raised for each received frame (sometimes a single interrupt is raised for multiple frames).
- **spur**: noise errors
- **shorts**: number of received frames with a truncated (too short) header.
- **dribble**: number of received frames with an incorrect header.
- **crc-err**: number of received frames with an incorrect CRC.
- **overf**: overflow errors (Ethernet controller).
- **good**: number of correct frames received.
- **cols**: collision errors.
- **stale**: Ethernet controller errors.
- **bad size**: frame length errors.
- **output**: total number of frames sent by the Office Server.
- **timeout**: time-out errors for sending frames.
- **unk-type**: number of non-IP or non-ARP frames received (IPX frames, for example).
- **drop**: number of dropped frames (because the input queue overflows).
- **nomem**: number of dropped frames (because of shortage of memory).

b - ARP Statistics

An ARP or RARP request is a request to determine the Ethernet number of a host, whose IP address has been given for a terminal-to-host connection

The first part of the ARP and RARP statistics displays requests, which have been sent to, or received from, the Office Server:

RARP:

- **received**: number of received RARP frames.
- **bad-type**: wrong frames.
- **bad-len**: frame length errors.
- **replies-in**: responses to RARP requests sent from the Office Server.
- **request-out**: RARP requests sent from the Office Server.

ARP:

- **received**: number of received ARP frames.
- **bad-type**: wrong frames.
- **request-in**: ARP requests received by the Office Server.
- **replies-in**: responses to ARP requests sent from the Office Server.
- **request-out**: ARP requests sent from the Office Server.

Next, all recognised '**IP Address/Ethernet Address**' associations are listed with the following parameters (ARP table):

- **IP addr**: IP address
- **Type**: Ethernet
- **Time**: number of seconds before this table entry will be dropped
- **Q**: number of frames which are waiting for address resolution (Ethernet address is 'unknown')
- **Addr**: Ethernet address associated with the IP address

c - IP Statistics

This option provides statistics relating to the IP layer:

- **total**: frames sent to, or received from, the Office Server
- **runt**: number of received frames with a truncated (too short) header
- **length-err**: frame length errors
- **version-err**: version errors
- **chksum-err**: checksum errors
- **unknown-proto**: unknown protocol errors

d - ICMP Statistics

The first part of these statistics displays errors relating to ICMP messages:

- **chksum-err**: checksum errors
- **nomem**: number of dropped frames (because of shortage of memory).
- **icmp-err**: number of inconsistent ICMP responses received.
- **bdcsts**: number of not-accepted broadcast ICMP messages received.

Next are listed ICMP messages sent to, or received from, the Office Server:

- **type**: ICMP message type (echo reply, destination unreachable, etc.)
- **rcvd**: number of received ICMP messages
- **sent**: number of sent ICMP messages

e - TCP Statistics

This option is used to display statistics about connections:

- **conin**: number of connection requests received by the Office Server.
- **conout**: number of connection requests sent by the Office Server.
- **reset-out**, **runt** and **chksum-err**: miscellaneous errors.
- **bdcsts**: number of broadcast messages received by the Office Server.

Each current session is listed with the following parameters.

- **Chan**: serial line number (from 1 to 4)
- **Rcv-Q**: data in input buffer
- **Snd-Q**: data in output buffer
- **Local Socket**: IP address and TCP port
- **Remote Socket**: IP address and TCP port
- **State**: status of connection (established, syn sent, etc.) and type of connection (setup, telnet, tty, etc.).

3.5.2 - Serial Line Statistics

To display serial line statistics, select **[Tools]→[Serial Statistics]**.

This option provides statistics relating to each Office Server serial line:

- **rxintr**: number of interrupts received by the Office Server.
- **rxchar**: number of character received by the Office Server (sometimes one interrupt is raised for multiple characters)
- **rxovrun**: 'overrun' error (missed character)
- **rxfperr**: parity error (bad character)
- **txintr**: number of interrupts raised to send characters
- **txchar**: number of character sent by the Office Server (sometimes one interrupt is raised for multiple characters)
- **msintr**: number of interrupts dedicated to modem signal management.

Furthermore, the status of CTS, DSR and DCD is available for each serial line.

The state of each signal can be:

- **f-dn** (found down): signal is 'down' (and it was 'down' the last time the serial line statistics was consulted)
- **f-up** (found up): signal is 'up' (and it was 'up' the last time the serial line statistics was consulted)
- **m-dn** (move down): signal is 'down' (and it was 'up' the last time the serial line statistics was consulted)
- **m-up** (move up): signal is 'up' (and it was 'down' the last time the serial line statistics was consulted)

CHAPTER 4

USING A SCRIPT TO SET-UP THE OFFICE SERVER

The Office Server can also be set up with a script. This allows Office Server settings to be archived, or several Office Servers to be set up with the same script.

4.1 - OVERVIEW

This method of Office Server set-up is performed using the rsh command. A script (whose file-name is given as an argument to the rsh command) contains the value of each set-up parameter.

The script may contain some or all the Office Server set-up parameters. It can either be:

- created with a text editor (**vi** for example) or
- obtained by sending a rsh command to an Office Server already set-up.

This feature allows:

- fast and safe installation, of multiple Office Servers with the same script,
- convenient site maintenance, supported by an archived configuration file for each Office Server,
- reduced support costs.

The rsh command is used both to apply the set-up, and to obtain the existing configuration of an Office Server. The rsh command parameters for remote administration are:

- host name: the Office Server hostname (listed in the **/etc/hosts** file),
- command option: one of the 3 following command options:
 - **setup_send**: set-up an Office Server,
 - **setup_get** : get Office Server configuration,
 - **ax_reboot** : reset an Office Server.

To access set-up from a telnet session, the IP address of the Office Server must already be set. This can be done either:

- with a serial terminal, connected to the admin. port (see chapter 2.1.1), or
- by specific embedded protocols using the Ethernet address (see appendix A.6).

4.2 - SETTING-UP AN OFFICE SERVER

To set-up an Office Server, use the rsh command, with the **setup_send** option. Use a pipe to read data from standard input:

```
# rsh axname setup_send password < conf_file <CR>
```

Notes:

- The next chapter explains how to create the configuration file **conf_file**, either using a text editor or using the '**setup_get**' command. Appendix A.7 contains a detailed description of the configuration file.
- **password**: specify the password if the set-up is password-protected.

The message 'Store set-up in progress...' is displayed on the operator console when the rsh command is processing. If a connection problem occurs, a time-out error message is displayed.

When the configuration has been successfully performed, the message 'OK, set-up updated' is displayed on the operator console. If other messages are displayed, refer to Section 4.4.

The Office Server must read this new set-up before it will take effect. This can be achieved either by power-cycling the Office Server or by the following rsh command:

```
# rsh axname ax_reboot password <CR>
```

Note: specify the password if the set-up is password-protected.

The message 'Reboot in progress...' is then displayed on the operator console, the Office Server is reset and the new set-up is implemented. If a connection problem occurs, a time-out error message is displayed.

4.3 - OBTAINING A CONFIGURATION

To obtain an Office Server configuration, use the rsh command together with the **setup_get** option. This command sends a list of all Office Server parameters to standard output, which may be redirected to a file:

```
# rsh axname setup_get > /tmp/file <CR>
```

The message 'Load set-up in progress...' is displayed on the operator console when the rsh command is processing. If a connection problem occurs, a time-out error message is displayed.

When the set-up parameters are loaded, the message 'OK, set-up sent' is displayed on the operator console. If other messages are displayed, refer to Section 4.4.

The configuration file lists each set-up parameter. Refer to Appendix A.7 for a detailed description of this file.

4.4 - ERROR MESSAGES

This section explains the error messages, which may appear (displayed on standard error'), during operation of the rsh command.

Two error groups are distinguished:

- fatal errors: numbered from 100 to 106
- set-up warning errors: numbered from 200 to 206
- other warning errors: numbered from 211 to 215

4.4.1 - Fatal Errors

Fatal errors stop the rsh command. The following fatal errors may occur:

ERR 101: header label expected. Setup not updated

Command: **setup_send**
Cause: BEGIN_AX4010_SETUP or BEGIN_AX4020_SETUP is not the first line of the configuration file.
Consequence: the Office Server set-up is not modified.
Solution: check the file. Replace it with a correct AXEL configuration file.

ERR 102: bad header label protocol version. Setup not updated

Command: **setup_send**
Cause: the protocol version (included in the header label) cannot be processed by the current Office Server firmware.
Consequence: the Office Server set-up is not modified.
Solution: use a configuration file with a compatible protocol.

ERR 103: Can't update setup, trailer label not found.

Command: **setup_send**
Cause: END_AX4010_SETUP or END_AX4020_SETUP is not found. Either this label was not included in the configuration file or the rsh connection failed.
Consequence: the Office Server set-up is not modified.
Solution: add this label to the end of file and run the rsh command again.

ERR 104: Can't get complete set-up (rcmd prematurely ended).

Command: **setup_get**
Cause: a network problem has occurred or the rsh/rcmd command has been killed or aborted.
Consequence: the set-up obtained by the command is invalid (the trailer label is missing).
Solution: run the rsh command again.

ERR 105: invalid rcmd command.

Command: any command
Cause: the remote command is unknown.
Consequence: no effect.
Solution: valid commands are listed in Appendix A.10

ERR 106: cmos busy.

Command: **setup_send**
Cause: another rsh command (**setup_get** or **setup_send**) is running, or another user has entered set-up, on the target Office Server.
Consequence: no effect.
Solution: Either wait for a few seconds then repeat the command, or arrange to exit set-up on the target Office Server.

ERR 113: password required

Command: **setup_send**, **ax_reboot** and **ax_download**
Cause: the AX4000 Interactive Set-Up is password-protected. This password hasn't be specified within the command.
Consequence: no effect.
Solution: use the right password.

ERR 114: invalid password

Command: **setup_send**, **ax_reboot** and **ax_download**
Cause: the AX4000 Interactive Set-Up is password-protected. This right password hasn't be specified within the command.
Consequence: no effect.
Solution: use the right password.

4.4.2 - Set-Up Warning Error Messages

Set-up warning error messages do not stop the rsh command but indicate a problem (such as a syntax error, for example). The following warnings may occur:

ERR 201: xxx: unknown parameter name.

Command: **setup_send**
Cause: this set-up parameter (xxx) is unknown.
(e.g.: tcp host1 name instead of tcp_host1_name).
Consequence: the set-up parameter is ignored. The current value of this parameter is retained.
Solution: check the syntax of the set-up parameter (appendix A.7).

ERR 202: xxx: inconsistent parameter name. Ignored

Command: **setup_send**
Cause: this set-up parameter (xxx) is not consistent (for example: a hayes command is included in direct line settings)
Consequence: the set-up parameter is ignored. The current value of this parameter is retained.
Solution: check the possible values of this parameter.

ERR 203: xxx: inconsistent parameter value. Ignored

Command: **setup_send**
Cause: the value given for this set-up parameter (xxx) is not consistent (for example: a client lpdrcmd service)
Consequence: the set-up parameter is ignored. The current value of this parameter is retained.
Solution: check the possible values of this parameter.

ERR 204: line(s) after the trailer label ignored.

Command: **setup_send**
Cause: END_AX40x0_SETUP is not the last line of the file.
Consequence: the lines after the trailer label are ignored. The Office Server set-up is updated.
Solution: delete these lines.

ERR 205: xxx: invalid parameter value. Ignored

Command: **setup_send**

Cause: the value given for this set-up parameter (xxx) is not valid
(For example: chl_service_type=tel).

Consequence: the set-up parameter is ignored. The current value of this parameter is retained.

Solution: check the possible values of this parameter (appendix A.7).

4.4.3 - Others Warning Error Messages

The following warning error messages indicate a problem during the check stage performed at the end of the remote set-up. The following warnings may occur:

ERR 211: Duplicated lpdrcmd qname. Duplicate qname(s) reset.

Command: **setup_send**

Cause: many lpdrcmd services use the same identifier.

Consequence: to get a consistent configuration, some services have been removed.

Solution: check service identifier values.

ERR 212: Duplicated router. Duplicate router(s) reset.

Command: **setup_send**

Cause: a destination can be reached by two (or more) routers.

Consequence: to get a consistent configuration, only one of these routers is retained

Solution: check the router table.

ERR 213: Incomplete router(s) info. router(s) reset.

Command: **setup_send**

Cause: router parameters are missing

Consequence: to get a consistent configuration, some routers have been removed.

Solution: check the router table.

ERR 214: Duplicated host. Duplicate host(s) reset.

Command: **setup_send**

Cause: two (or more) host names are identical.

Consequence: to get a consistent configuration, only one of these hosts is retained

Solution: check the host table.

ERR 215: Incomplete host(s) info. host(s) reset.

Command: **setup_send**

Cause: host parameters are missing.

Consequence: to get a consistent configuration, some hosts have been removed.

Solution: check the host table.

CHAPTER 5

DOWNLOADING FIRMWARE

This feature may be used to upgrade the Office Server firmware over a network.

Firmware can be downloaded, for example to add or improve features.

5.1 - OVERVIEW

5.1.1 - Downloading Protocols

Firmware can be downloaded in one of two ways:

- **tftp** protocol: the operator must enter the location of the firmware file.
- **bootp** and **tftp** protocol: this is an automatic procedure. The necessary parameters will already be available from the UNIX configuration.

Whichever method is used, the firmware file is downloaded from a host (called the tftp host). Following this the Office Server is automatically reset and the new firmware is enabled.

These two methods can be run either:

- using the rsh command from another network host (remote administration) or
- through the set-up of the Office Server that is to be upgraded.

5.1.2 - Suitable Settings

Some operating systems don't include as a standard feature the tftp and bootp protocols (Windows NT for instance). In this case, these 2 protocols must be bought and installed as additional software.

Under Unix, these 2 protocols are included, but the default configuration does not launch the **tftp** and **bootp** daemons. To enable these protocols perform the following:

- modify the file **/etc/inetd.conf** by removing the '#' comment character, from the beginning of the line(s) associated with **tftp** and/or **bootps**
Note: for tftp, take care to use the 'public' mode (example: for SCO Unix the **tftpd** daemon **must be launched without** the '-s /tftpboot' parameter).
- reboot the UNIX host (or send the signal 1 to the **inetd** process).

Examples: typical tftp lines in /etc/inetd.conf:

UNIX SCO

```
tftp dgram udp wait nouser /etc/tftpd tftpd
```

AIX 4.x

```
tftp dgram udp nowait nobody /usr/sbin/tftpd tftpd -n
```

LINUX

```
tftp dgram udp wait root /usr/sbin/tcpd in.tftpd /
```

UNIXWARE 7

```
tftp dgram udp wait nobody /usr/sbin/in.tftpd in.tftpd
```

5.1.3 - Firmware File Characteristics

The Office Server hardware is identified by a 'Flash Key' (FK). There are currently three different generations of hardware in the field, each requiring specific firmware:

- FK21 and FK22: AX4010 former production hardware
- FK24: AX4010 current production hardware
- FK23: AX4020 current production hardware

The correct firmware file must be downloaded for your Office Server hardware. If FK22 firmware file is downloaded into FK24 hardware, the download process will fail (see appendix A.9).

The Office Server hardware version is included in the general Office Server firmware revision (ex.: FK24-BV1.2a/TCP.XX.0029d.STD). To get the Office Server firmware revision and the hardware revision, use one of the following:

- enter the Office Server interactive set-up, the revision is shown in the general menu,
- get the Office Server set-up by the following rsh command (the revision is included in the text file banner):
rsh axname setup_get > file
- Use the following rcmd (or rsh) command to get the revision directly:
rsh axname ax_version

5.2 - DOWNLOADING BY TFTP PROTOCOL

To download firmware using the tftp protocol, the firmware file location (filename and tftp host IP address) must be given.

5.2.1 - By a rsh Command

The rsh command syntax is as follows:

```
# rsh axname ax_download file tftpIP routeIP <CR>
```

- axname: Office Server hostname listed in /etc/hosts,
- ax_download: command option for firmware downloading,
- file: path and name of the firmware file,
- tftpIP: name or IP address of the tftp host. (If the name is used, this hostname must be listed in the target Office Server set-up),
- routeIP (optional): name or IP address of a router to reach the tftp host. (If the name is used, this router name must be listed in the target Office Server set-up).

Example 1:

```
# rsh ax4011 ax_download /usr/firm 192.168.1.249 <CR>
```

Example 2: a router is used

```
# rsh ax4012 ax_download /usr/firm vangogh 192.168.1.249 <CR>
```

Possible errors (displayed on the operator's console):

- ERR 105: invalid rcmd command: incorrect command option (check the syntax).
- ERR 108: invalid number of parameters: bad parameter number (2 or 3 parameters are required after the command option).
- ERR 109: invalid file length: the filename is too long (more than 31 characters).
- ERR 110: invalid server: the tftp host name is unknown (not listed in the Office Server set-up).
- ERR 111: invalid router: the router name is unknown (not listed in the Office Server set-up).

Note: other errors messages can also be displayed (connection time-out for example). Refer to your system manuals.

5.2.2 - From the Interactive Set-Up

Use a serial terminal or a telnet connection to access the interactive set-up (cf. chapter 2.1). Select **[Download Firmware]**→**[Download by tftp]**.

The following information must be entered in the four fields:

- **Filename:** path and name of the firmware file,
- **IP Address:** this is an IP address only used during the download operation. It can differ from the current IP address,
- **Server IP Addr./Name:** name or IP address of the tftp host (if the name is used, this hostname must be listed in set-up),
- **Router IP Addr./Name** (optional): name or IP address of a router via which the tftp host can be reached (If the name is used, this router's hostname must be listed in the target Office Server set-up).

After confirmation, the download operation is run.

5.3 - DOWNLOADING BY BOOTP AND TFTP PROTOCOLS

This procedure is divided into 2 steps:

- **bootp:** asks for firmware file information,
- **tftp:** downloads the firmware file.

The bootp protocol is used to get the IP address of the tftp host and the firmware filename. This information is returned in response to a broadcast.

The Unix/Linux bootp host, selected for this function, must have been configured with information concerning this firmware file.

Note: the bootp host and the tftp host can be different machines.

Prerequisites for bootp:

- the bootpd process must be run on the bootp host.
- the bootpd configuration file (**/etc/bootptab**) must list an entry for every Office Server which can download firmware.
- the bootp host must be directly accessed by the Office Server (not via a router). Otherwise a bootp relay host must be set up.

The main capabilities of the bootpd configuration file are as follows:

- tc: network description
- ht: network type
- sa: IP address of tftp host
- sm: network mask
- gw: optional router
- vm: magic number (use only for a router)
- ha: Ethernet address of the Office Server
- ip: IP address of the Office Server (this address is only used during the downloading operation)
- bf: firmware filename

Examples of bootp configuration files:

a) The Office Server and the tftp host belong to the same network

```
net:hn:df=/etc/btdump:ht=ethernet:sa=192.168.1.252:to=auto:
axel1:tc=net:ht=ethernet:ha=00A034100001:ip=192.168.1.242:bf=/tmp/axel:
```

b) The Office Server accesses the tftp host via a router

```
net:hn=df=/etc/btdump:ht=ethernet:sa=192.1.1.243:to=auto:

net1:tc=net:sm=255.255.255.000:gw=192.168.1.252:

axel1:tc=net1:ht=ethernet:vm=rfc1048:ha=00A034100001:ip=192.168.1.242:bf=
/usr/axel/firm9801:
```

IMPORTANT: if a problem occurred during a previous download operation (whatever method was used), the firmware of the target Office Server may have been erased. To restore valid firmware, the bootp+tftp protocol will automatically be run when this target Office Server is turned on.

5.3.1 - By a rsh Command

The rsh command syntax is as follows:

```
# rsh axname ax_download file tftpIP routeIP <CR>
- axname: Office Server hostname listed in /etc/hosts,
- ax_download: command option for firmware downloading,
```

For example:

```
# rsh ax4011 ax_download <CR>
```

The following error message can be displayed (on the operator's console):

```
-ERR 105: invalid rcmd command: incorrect command option
(check the syntax).
```

Note: other error messages can also be displayed (connection time-out, for example). For explanations refer to your system manuals.

5.3.2 - From the Interactive Set-Up

Use a serial terminal or a telnet connection to access the interactive set-up (cf. chapter 2.1). Select **[Download Firmware]→[Download by boot + tftp]**.

After confirmation, the download operation is run.

5.4 - DOWNLOAD PROCESSING

The download operation comprises 4 stages, which are signalled by the 8 leds dedicated to the 4 serial ports:

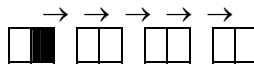
- bootp stage: the Ch4 leds flash for 1 second



- beginning of tftp stage: the Ch3 leds flash for 1 second



- firmware downloading: the 8 leds alternatively light during the file transfer



- firmware is downloaded: the 8 leds light for 1 second



The Office Server is then automatically reset and the new firmware is enabled.

Errors may occur during the firmware downloading. These errors are encoded by the 8 leds of the 4 serial ports. For more information, refer to appendix A.9.

Notes:

- If any error occurs, the Office Server should be power-cycled.
- A firmware download may reset all current settings of the Office Server except the IP address.
- If an error occurs during the stage when firmware is erased, the Office Server will be without valid firmware. The next time it boots, the Office Server will broadcast bootp requests to get valid firmware.

APPENDIX

The following appendices give information about:

- network overview (Ethernet addresses, IP addresses and routers),
- adding an LPD printer within an operating system,
- installing the AXEL tty server under UNIX,
- virtual ports on SCO Unix,
- virtual COMs on Windows,
- managing locally a modem,
- using the Ethernet address to provide an IP address,
- keepalive Function,
- Office Server configuration script,
- description of the Office Server leds.

A.1 - NETWORK OVERVIEW

A.1.1 - Ethernet Addresses

Office Servers (like other devices equipped for Ethernet networking) have a unique hardware address, which is issued by the manufacturer and cannot thereafter be modified. The address is in the form of six hexadecimal bytes, separated by colons, thus:

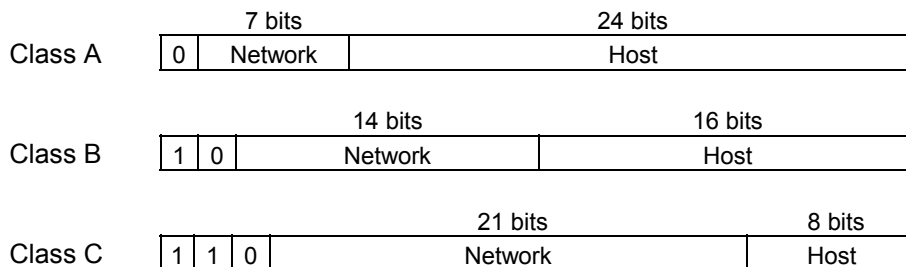
Office Server Ethernet address format is:

- 00:A0:34:10:xx:xx for the AX4010
- 00:A0:34:12:xx:xx for the AX4020

A.1.2 - IP Address

Every device connected to an Ethernet network must have a single 32-bit address, which encodes network and host ID. Internet addresses (sometimes called «IP addresses») are usually written as four decimal numbers separated by decimal points ('.' character).

There are three main classes of IP address:



Thus every IP address occupies 4 bytes and contains both:

- a network address, and
- a host address.

even though these may be of varying lengths.

Note: all devices attached to the same network must have the same class and the same network address. Each must have a different host address.

For example: an Office Server connected, over a network, to a host with an IP address 192.1.168.40 (class C: three bytes for the Network address) must have the three first bytes of its address set to 192.1.168. The fourth byte cannot be equal to 40.

A.1.3 - Routers

Depending on the network topology, the Office Server and the host may be installed on different physical networks and linked through one or several routers. In this configuration, **any router** that is to be declared in the Office Server set-up **must belong to the same physical network** as the Office Server.

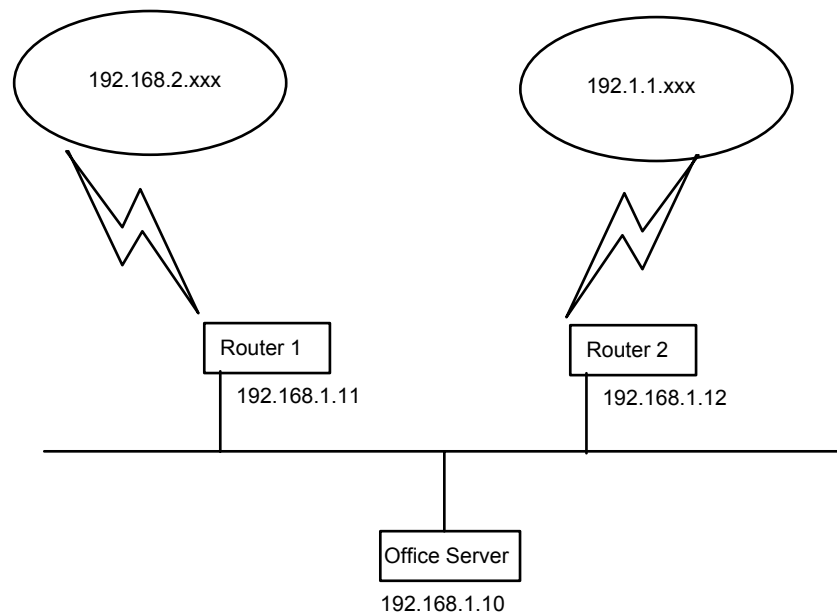
To declare a router, use the '**Add Route**' option and enter the following three parameters:

- **Gateway Address**: router IP address. This router must be connected to the same network as the Office Server.
- **Host IP Address**: IP address of the host to be reached.
- **Mask**: logical mask on the host IP address. The default value of this mask distinguishes the host segment from the network segment of the IP address.

At the Office Server level, a router is described as follows:

- **Route IP address**: this router must be connected to the same network as the Office Server.
- **Dest. IP address**: either the command option **default** (as default router) or the IP address of the remote network equipment.
- **Type**: 2 values
 - **host**: to reach the host described by **Dest. IP address** (and only this host),
 - **net**: to reach the network of the equipment described by **Dest. IP address** (the network class is automatically applied to the destination IP address)

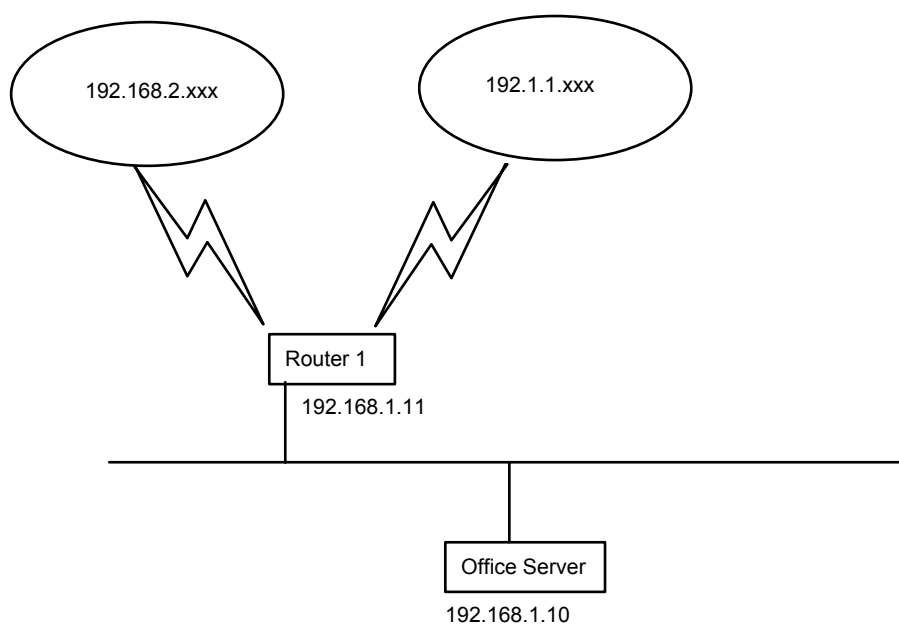
Example 1: router 1 is used to reach the 192.168.2.xxx network and router 2 is used to reach the 192.1.1.xxx network:



The Office Server route table is:

	Route IP address	Dest. IP address	type
router 1	192.168.1.11	192.168.2.0	net
router 2	192.168.1.12	192.1.1.0	net

Example 2: router 1 is used to reach both networks (192.168.2.xxx and 192.1.1.xxx):



The Office Server route table is:

	Route IP address	Dest. IP address	type
router 1	192.168.1.11	default	net

A.2 - LPD PRINTERS

This appendix gives the information needed to add an LPD printer under your operating system. For more information, refer to your system manuals.

A.2.1 - UNIX

Use the UNIX System Management Tool to add a remote printer. At least, two parameters are required:

- the name of the remote host: enter the Office Server's hostname (refer to **/etc/hosts**),
- the name of the printer: this is the **Queue Name** entered when the Office Server was set up.

Run the **lp** command to use this printer.

Note: some options of the **lp** command (number of copies, banner, etc.) cannot be used, because the Office Server is not a UNIX host system and has no hard disk on which to run a spooler.

a - Using lpd under IBM AIX V3.x

Enter the SMIT fast path **smit mkrque**. Four parameters are required:

- **Name of Queue to Add:**
 - ⇒ name of the printer accessed by the **lp** command
- **Destination Host for Remote Jobs:**
 - ⇒ hostname of the Office Server (refer to **/etc/hosts**)
- **Name of Queue on Remote Printer:**
 - ⇒ Queue Name associated with the Office Server's port
- **Name of Device to Add:**
 - ⇒ device name of printer on AIX

b - Using lpd under IBM AIX V4.x

Enter the SMIT fast path **smit spooler** then select '**Add a Print Queue**' and '**Remote**'.

Printers can be added using either of two methods:

- **Standard Processing:** AIX sends a raw file to the Office Server. Three parameters are required:
 - **Name of Queue to Add:** name of the printer accessed by the **lp** command
 - **Destination Host for Remote Jobs:** hostname of the Office Server (refer to **/etc/hosts**)
 - **Name of Queue on Remote Printer:** Queue Name associated with the Office Server's port

- **Local Filter:** AIX passes the file to the printer through a formatting filter. The first parameter required is the type of printer. Select this from the list of supported printers. Three parameters are required:
 - **Name of Queue to Add:** name of the printer accessed by the **lp** command
 - **Destination Host for Remote Jobs:** hostname of the Office Server (refer to **/etc/hosts**)
 - **Name of Queue on Remote Printer:** Queue Name associated with the Office Server's port

Note: Use of the Local Filter method is strongly recommended.

c - Using lpd under SCO UNIX

Run **scoadmin** and select **[Printer]→[Printer Manager]**. Then select **[Printer]→[Add Remote...]→[UNIX]**. A dialog box is displayed. Two parameters are required:

- **Host:** hostname of the Office Server (refer to **/etc/hosts**)
- **Printer:** Queue Name associated with the Office Server's port

A.2.2 - Windows

To add a printer, select the **'Add printer'** icon (in the 'Start'→'Settings'→'Printers' menu).

Within the displayed dialog box, select **'Local printer'** (Disable the Plug-And-Play detection). Click on 'Next'.

Within the next dialog box, select '**Create a new port**' and select '**LPR Port**'. Click on 'Next'.

Note: if 'LPR Port' is not available, you need to install '**Print Services for Unix**'.

Finally within the next dialog box, enter the two requested parameters:

- name or address of the server providing LPD: AX4000 IP address.
- name of printer or print queue of that server: This is the '**Printer Port Name**' AX4000 Set-Up parameter.

When this printer is added, all print jobs sent to this printer are automatically redirected to the AX3000.

A.2.3 - OS/400

To add a system printer invoke the following command (AXPRT01 is the OS/400 printer name):

```
==> CRTDEVPRT DEVD(AXPRT01) DEVCLS(*VRT) TYPE(3812) MODEL(1) FONT(11)
```

To associate this printer with the Office Server LPD port, its outqueue must be modified:

```
==> CHGOUTQ OUTQ(AXPRT01) RMTSYS(*INTNETADR) RMTprtQ('CH1') CNNTYPE(*IP)  
DESTTYPE(*OTHER) TRANSFORM(*YES) MFRTYPMDL(*NECP2)  
INTNETADR('192.168.1.240')
```

where:

- AXPRT01 : OS/400 outqueue name
- CH1 : remote printer name (Office Server Set-Up)
Uppercase letters are required
- *NECP2 : printer model (here a NEC type P2)
- 192.168.1.240 : AX4000 IP address

A.3 – UNIX/LINUX AXEL TTY SERVER

A.3.1 - Introduction

The AXEL tty server is a Unix/Linux daemon (axttyd). The axttyd daemon must be used with the Office Server **tty client** or **tty server** network services.

The AXEL tty server associates a device on the Unix/Linux host with an Office Server resource:

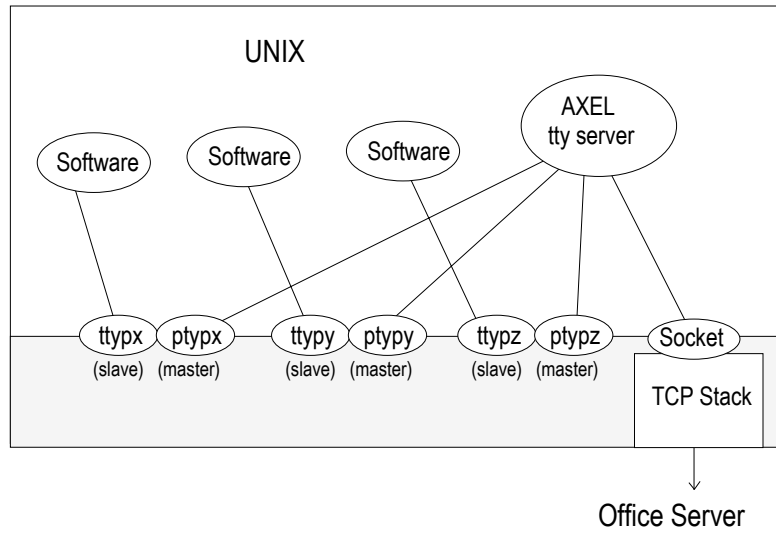
- the device is a pseudo-terminal (see below),
- the Office Server resource is a serial port (ex.: ch1, ch2, etc).

This enables data written to the UNIX host device to be sent to the Office Server port, and data received via the Office Server port to be read through the UNIX host device.

Note about pseudo-terminals: a pseudo-terminal is composed of two parts: a master file and a slave file. UNIX supports two possible styles for naming pttys:

- one master and x slaves (AT&T style): the master filename is `/dev/ptmx` and the slave filenames are `/dev/pts/xxx` (where xxx is a number).
- x masters and x slaves (Berkeley style): the master filename is `/dev/ptyxxx` and the slave filenames are `/dev/ttypxxx` (where xxx is the same number for master and slave).

The following drawing shows the UNIX mechanisms:



A.3.2 - Installing an AXEL tty server

Copy to **/etc** and rename as **axttyd** the appropriate binary. Example for IBM AIX:

```
# cp axttyd.AIX /etc/axttyd <CR>
```

Note: the source file and the **makefile** are also provided. If the binary file required for your operating system is not provided, it can be generated.

Copy the AXEL association file (**axfile**) into the **/etc** directory:

To launch the AXEL tty server automatically, whenever the host is booted, copy into the boot directory the **S91axel** file (for Unix) or the **S91axtty** file (for Linux).

The **S91axel** or **S91axtty** files launch the AXEL tty server. If parameters other than the default are required, this command line can be edited.

A.3.3 - Using an AXEL tty server

a – Overview

The AXEL tty server uses a configuration file, which lists all authorised associations between Office Server ports and UNIX ptty's.

Each entry in this file contains four parameters:

- Office Server hostname (see **/etc/hosts**)
- Office Server resource depends on the used tty service
 - tty client: a keyword (lowercase characters): **ch1, ch2, ch3, ch4** (and **ch5, ch6, ch7, ch8** with the AX4020).
 - tty server: a TCP Port (number)
- the master file of the ptty
- the slave file of the ptty

For example:

# AXEL association file			
#	Device	Resource	Master Slave
	axel1	ch1	/dev/ptyp12 /dev/ttyp12
	axel1	ch2	/dev/ptmx /dev/pts/13
	axel2	2050	/dev/ptyp0 /dev/ttyp0
	axel2	ch4	/dev/ptyp1 /dev/ttyp1

Notes:

- Lines beginning with '#' are ignored.
- Association lines 1, 2, 4 and 5 use the tty service, and association line 3 uses rty service.

This configuration file is read when the AXEL tty server is launched.

Errors (syntax error, unknown Office Server hostname, ptty not available, etc.) are recorded in a log file.

b - running Axel tty server

The command to start the AXEL tty server is:

```
/etc/axttyd [-f file] [-l log] [-n port] &
```

- f: configuration file (default: /etc/axfile).
- l: log file (default: /tmp/axttylog).
- n: TCP port (default: 2048) for connections using the tty client service.
- b: using a buffer for the data reception.

The AXEL tty server can be started either from the UNIX command line or from the AXEL boot.

Note: if the server is started from the command line, take care to add the '&' character at the end of line, so the command will be run in the background and the UNIX prompt will return.

All authorised associations, connections and disconnections will be recorded in the specified log file.

A.3.4 -The axttyd Mechanism

The axttyd daemon performs the following tasks:

- association file checking (errors are recorded in the log file),
- associated pty opening (masters and slaves),
- for each tty server association, a child process is created. Each child process listens on the corresponding pty. As soon as data is received, a socket is opened on the Office Server serial port and bi-directional communication is enabled. If no data is sent or received during any one-minute interval, the connection is closed. It will be re-opened, and then data is received from the pty.
- Once tty server child processes have been created, the axttyd daemon listens on the TCP/IP socket (generally 2048). For each connection request (from an Office Server tty client service), a child process is created. This child process controls communication between the pty and the Office Server serial port.

A.3.5 - Uninstalling

Remove the AXEL files and kill the AXEL tty server process (signal TERM):

```
# kill -TERM pid<CR>
```

where pid is the process ID of the AXEL tty server.

A.4 - VIRTUAL COMS ON WINDOWS

The virtual COM feature allows the Windows operating system to control the Axel Office Server serial ports as standard local serial ports. Any software can use standard O.S. commands:

- to set serial line parameters (baud rate, parity, etc),
- to set serial output signals (DTR and RTS),
- to get serial input signal status (DSR, CTS and CD).

Accordingly any serial device (modem for instance) can be connected either to a 'real' COM or to a 'virtual' COM. This is totally invisible to the software (fax control for instance).

The virtual COM installation procedure is composed of the following:

- setting-up the Office Server,
- installing virtual COM driver,
- virtual COM selection (through a list),
- setting-up virtual COMs (IP address, TCP port, etc.).

This makes the virtual COMs available for all software.

A.4.1 - Setting-Up the Office Server

See the Chapter 2.5.4 to set the Office Server serial port(s).

A.4.2 - Installing the DialOut/IP Driver

The DialOut/IP driver is available for any Windows versions. This driver is released by Tactical Software (www.tactical-sw.com).

To install the driver, perform the following:

- run Windows Explorer,
- copy the Tactical Software ".exe" file to the hard disk,
- double-click this icon file to start installation,
- follow the Wizard Installation instructions.

Once the driver is installed, a specific icon is displayed on the task bar (near the clock). This icon is used to set-up virtual COMs.



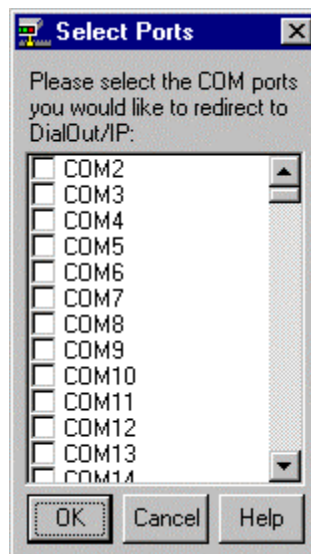
A.4.3 - Adding Virtual COMs

Two steps are needed to create a virtual COM:

- Creating the COM,
- Setting the COM.

a - Creating a COM

At the end of the driver installation a dialog box dedicated to COM Creation is displayed (see below). To create virtual COMs, tick entries in this list.

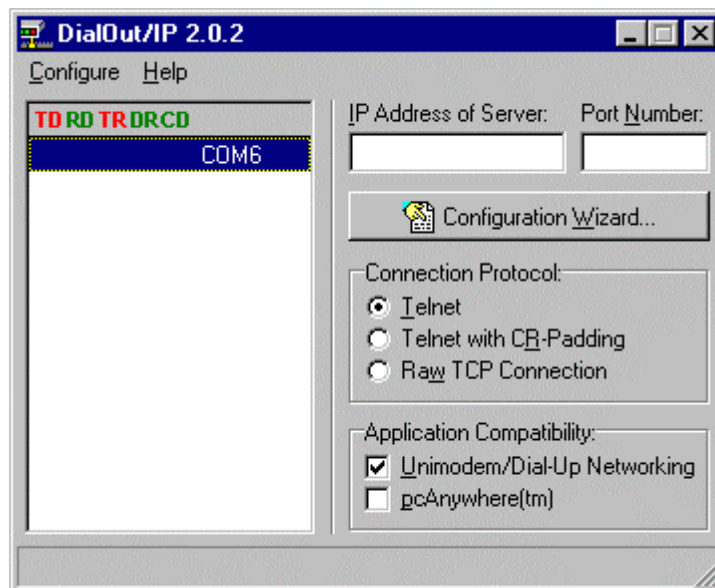


To access this dialog box at a later stage, click the right mouse button on the driver icon and select the **'ports'** command within the displayed menu.

Note: please reboot the computer after any modification to this COM list.

b - Setting-Up a Virtual COM

To enter the dialog box controlling the COM settings, double click on the driver icon. This box allows the set-up for virtual COMs (i.e. previously created through the COM Creation box):

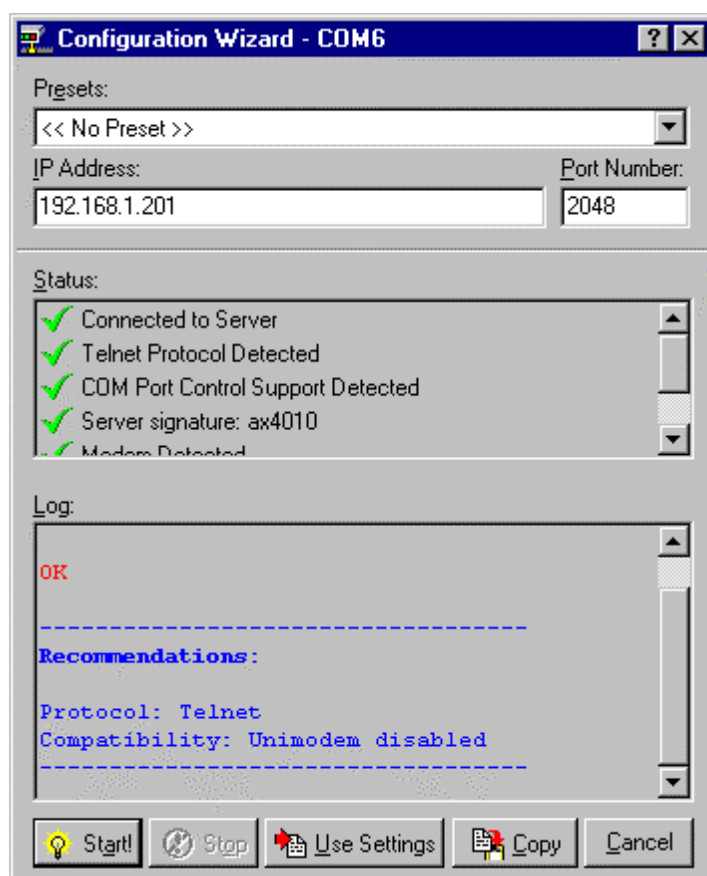


A virtual COM is defined by:

- a name (selected through the list; in this example only COM6 is available),
- an IP address: the Office Server IP address,
- a Port Number: the identifier is the 'TCP Port' associated with the 'telnet server' during the Office Server setting (see Chapter 2),
- a protocol: use the 'telnet' protocol. Other protocols must be disabled (for example, Unimodem protocol is enabled by default).

c - Testing a COM

Click on the 'Configuration Wizard' button (on the previous dialog box) to test a virtual COM. If needed, enter the 'IP address' and 'Port Number' values. Then click the 'start' button. After few seconds the results are shown:



Note: after testing, recommended settings can be kept by clicking the 'Use Settings' button.

A.4.4 - Using a Virtual COM

Under Windows 95 and 98, virtual COMs are seen as standard Windows resources. In this case a printer can be attached immediately to COM6.

Under Windows NT and 2000, the virtual COM must be added through the Control Panel (i.e. add the port 'COM6:' to provide COM6 to Windows NT).

Note: This operation is only needed to see a virtual COM as a standard Windows resource (to attach a printer for example). Sometimes this operation is not needed as the software used may automatically access this virtual COM (fax control for example).

A.5 - MANAGING LOCALLY A MODEM

The Office Server is able to manage locally a modem. This allows the operating system to 'see' this connection as a direct connection. This feature offers a simplest operating system configuration (ex.: a serial dumb terminal connected via modem).

A.5.1 - Dial-In or Dial-Out

According to the associated network service, the Office Server can dial-out or receive calls:

- lpd/rcmd, telnet server and tty server: the Office Server dials out to the remote computer,
- tty client and telnet client: the Office Server waits for incoming calls from the remote computer.

A.5.2 - Modem Rules

The Office Server follows the following modem rules:

1 - If no carrier is detected (CD signal is down), the HAYES reset and init sequences are sent to the modem in the following cases:

- the Office Server is powered up when the modem is already switched on,
- the modem is power-cycled,
- the call is terminated,
- the serial line is reset when the modem is already switched on.

2 - The HAYES init sequence is sent 2 seconds after the HAYES reset sequence.

3 - When an Office Server network service opens a TCP/IP connection, the Office Server dials the modem (ATD+phone number) if a carrier is detected (CD signal is down).

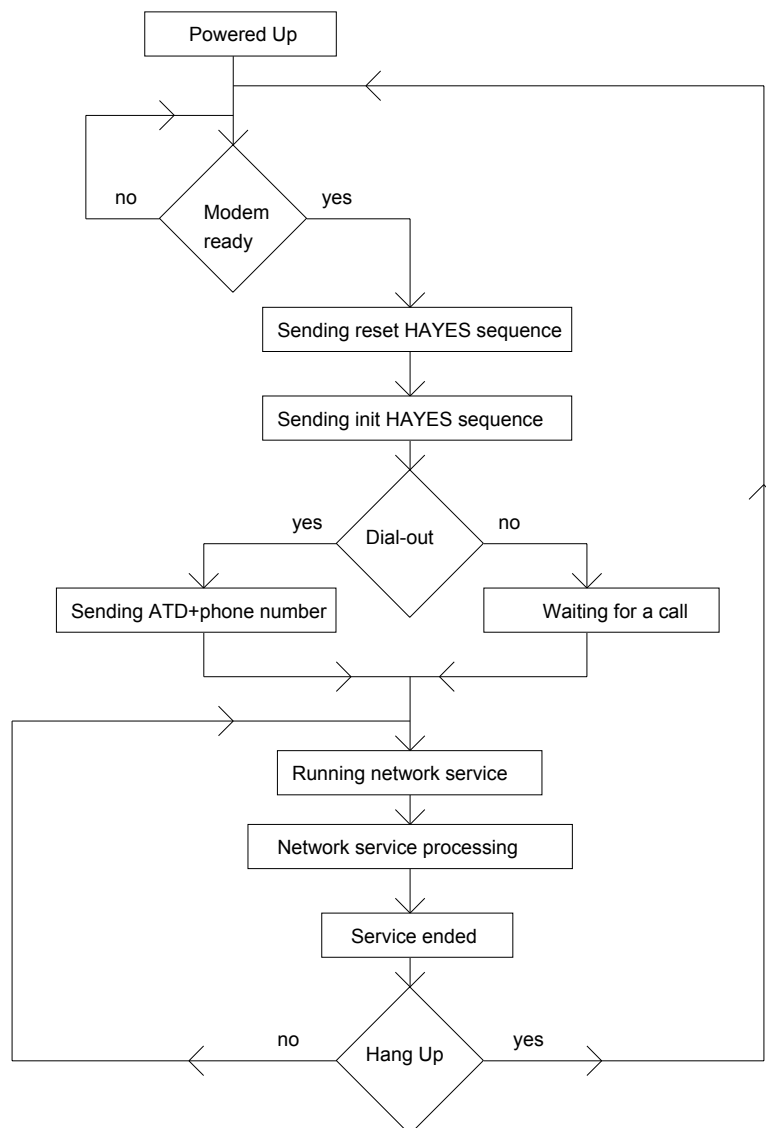
4 - The Office Server detects the modem presence, either by a signal (DSR or CTS) from the modem, or by the modem responding OK (or 0) when the Office Server sends it an AT sequence.

5 - The Office Server can terminate a call (network service ended or inactivity on line) by using the RTS or DTR signals or by using a HAYES sequence.

6 - You MUST use a handshake protocol. Hardware handshaking (RTS/CTS) is better than software (XON/XOFF) flow control.

A.5.3 - Modem Flow Chart

The diagram shows how an Office Server serial port handles a modem:



A.5.4 - Setting-Up the Modem

The HAYES reset and init sequences are used to set-up the modem.

Reset sequence: load factory settings (generally AT&F, but check with your modem handbook).

Init sequence: this sequence must set-up the following features:

- local echo OFF,
- results codes suppressed,
- CD signal when it connects,
- dropping DTR terminates a call,
- RTS/CTS handshake used,
- set disconnect inactivity timer (if supported),
- save modification in NVRAM.

Example: for COM1 MV324B:

- Reset AT&F
- Initialisation ATE0Q1V0X0&C1&D2&K3S0=0S2=255S30=18&W

A.6 – USING ETHERNET ADDRESS TO SET UP IP ADDRESS

The interactive set-up can only be used if the IP address of the Office Server is already set.

If no serial terminal is available (to access set-up via the Ch4 port), provided its Ethernet Address is known the Office Server's IP address can still be set as follows:

A.6.1 – If the Office Server IP Address is not Valid

When the Office Server is shipped, its IP address is set to 0.0.0.0. The presence of this value changes the Office Server's behaviour, when it is powered up, as follows:

The following operations are performed to get a valid IP address:

- 3 RARP requests are broadcast. If a RARP server sends a valid answer, the Office Server IP address is updated.

To signal that this operation is occurring, the Ch4 and Ch3 leds flash:



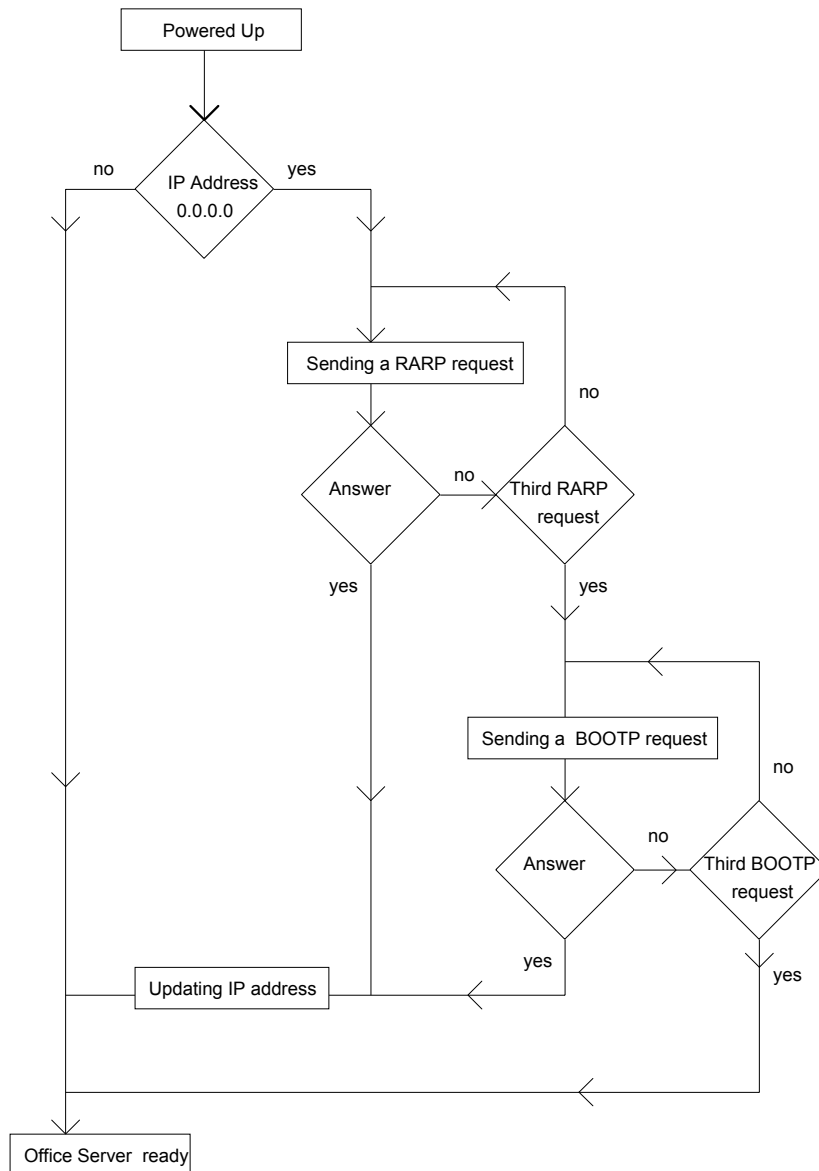
- if no RARP answer is received, 3 BOOTP requests are broadcast. If a BOOTP server sends a valid answer, the Office Server IP address is updated.

To signal that this operation is occurring, the Ch2 and Ch1 leds flash:



Note: This operation only takes place if a RARP server or BOOTP server has been set up. Such a server uses a parameter file to associate each Ethernet address with an IP address. For more information, refer to your system manuals.

The following diagram illustrates RARP and BOOTP processing:



A.6.2 – If the Office Server IP Address is Unknown

If the Office Server IP address is unknown, it is impossible to use the interactive set-up (except with a serial terminal connected to the admin. port).

The procedure used overwrites the current (unknown) IP address with a new (known) one. The Office Server has a special protocol built in: if 8 ping requests are received, with an IP address different from the current one, the Office Server IP is updated and the Office Server is rebooted.

Note: the '**Ping change IP addr.**' AX4000 set-up parameter must be set to 'y' (default value). For more information, refer to Chapter 2.7.3.

Using under UNIX:

Run the following command to associate the Office Server's Ethernet address xx:xx:xx:xx:xx:xx with the IP address yyy.yyy.yyy.yyy (this command updates the ARP table):

```
# arp -s yyy.yyy.yyy.yyy xx:xx:xx:xx:xx:xx <CR>
```

Run a ping command:

```
$ ping yyy.yyy.yyy.yyy <CR>
```

After 10 seconds the Office Server should answer. The Office Server IP address is now yyy.yyy.yyy.yyy.

A.7 - CONFIGURATION SCRIPT FORMAT

A configuration file can list some or all Office Server set-up parameters.

The configuration file begins with the header label `BEGIN_AX40x0_SETUP` and ends with the trailer label `END_AX40x0_SETUP` (AX40x0 stands for AX4010 or AX4020).

For example:

```
BEGIN_AX4010_SETUP V1.1
# this is a comment
tcp_host1_name=vangogh
...
END_AX4010_SETUP
```

Note: lines beginning with '#' are treated as comments and ignored.

Set-up parameters are divided between the following parameter groups:

Ethernet:	Ethernet interface parameters,
TCP/IP:	network environment,
Ch1 Port:	port service and communication parameters,
Ch2 Port:	port service and communication parameters,
Ch3 Port:	port service and communication parameters,
Ch4 Port:	port service and communication parameters.
And only for the AX4020:	
Ch5 Port:	port service and communication parameters.
Ch6 Port:	port service and communication parameters.
Ch7 Port:	port service and communication parameters.
Ch8 Port:	port service and communication parameters.

Several formats are available for set-up parameter values:

List:	the possible values are listed (the character ' ' is used as a separator). Examples: (yes no). (none xon-xoff xpc dtr)
Number:	maximum and minimum values are given.
Character string:	maximum length is given. Note: an ASCII character can be represented by its hexadecimal ASCII code, preceded with a backslash character (e.g.: \1B represents Escape and \\ represents a backslash).
IP address format:	the IP address format is xxx.xxx.xxx.xxx.

In the following parameter lists, the possible values are bracketed after each set-up parameter.

A configuration file can either be created using a text editor, or obtained from an already configured Office Server (by using **rsh setup_get**).

When a configuration file is obtained from an Office Server, the inactive parameters (undefined hosts, network service unused, etc.) are commented out.

The sample configuration file, shown in the following pages, is typical of a file obtained from an already configured Office Server. The notes and headings have been inserted for clarification and would not appear in the file.

Header

```
BEGIN_AX40x0_SETUP V1.1
#####
#           TCP/IP AX40x0 Office Server           #
#                                                                 #
# Ethernet address: 00:A0:34:10:27:10             #
# Firmware: FK3.BV1.1e/FR.9926a                  #
#####
#
# RESET_CMOS
```

Note: the `RESET_CMOS` command allows all set-up parameters (except the Office Server IP address) to be reset. When the configuration file is obtained from an Office Server, this `RESET_CMOS` command is displayed as a comment.

Ethernet Parameters

```
#ethernet_ipname=192.168.1.241 (character string, 15 char max.)
#ethernet_ipaddr=192.168.1.241 (IP address format)
#ethernet_netmask=255.255.255.0 (IP address format)
```

Note: When a configuration file is obtained from an Office Server, the `ethernet_XXX` parameters are commented out (so that this file can be used for configuring other Office Servers).

TCP/IP Parameters

tcp_host1_name=vangogh	(character string, 15 char max.)
tcp_host1_ip=192.168.1.252	(IP address format)
tcp_host2_name=picasso	(character string, 15 char max.)
tcp_host2_ip=192.168.1.248	(IP address format)
tcp_host3_name=pablo	(character string, 15 char max.)
tcp_host3_ip=192.168.1.249	(IP address format)
tcp_host4_name=vincent	(character string, 15 char max.)
tcp_host4_ip=192.168.1.250	(IP address format)
#tcp_host5_name=	(character string, 15 char max.)
#tcp_host5_ip=	(IP address format)
#tcp_host6_name=	(character string, 15 char max.)
#tcp_host6_ip=	(IP address format)
#tcp_host7_name=	(character string, 15 char max.)
#tcp_host7_ip=	(IP address format)
#tcp_host8_name=	(character string, 15 char max.)
#tcp_host8_ip=	(IP address format)
tcp_defrouter_ip=192.168.1.252	(IP address format)
tcp_router1_ip=192.168.1.252	(IP address format)
tcp_router1_target=192.1.1.252	(IP address format default)
tcp_router1_type=net	(net host)
tcp_router2_ip=192.168.1.253	(IP address format)
tcp_router2_target=192.18.1.2	(IP address format default)
tcp_router2_type=net	(net host)
tcp_router3_ip=0.0.0.0	(IP address format)
tcp_router3_target=default	(IP address format default)
tcp_router3_type=net	(net host)
#tcp_router4_ip=	(IP address format)
#tcp_router4_target=	(IP address format default)
#tcp_router4_type=	(net host)
#tcp_router5_ip=	(IP address format)
#tcp_router5_target=	(IP address format default)
#tcp_router5_type=	(net host)
#tcp_router6_ip=	(IP address format)
#tcp_router6_target=	(IP address format default)
#tcp_router6_type=	(net host)
#tcp_router7_ip=	(IP address format)

```
#tcp_router7_target=      (IP address format | default)
#tcp_router7_type=        (net | host)
#tcp_router8_ip=          (IP address format)
#tcp_router8_target=      (IP address format | default)
#tcp_router8_type=        (net | host)
```

Note: if a configuration file is obtained from an Office Server, undefined hosts and routers are commented out.

Router explanation:

- **default router:** tcp_defrouter_ip is the default router IP address
- **other routers:** tcp_router%_ip is the router IP address, tcp_router%_target is the destination IP address and tcp_router%_type is the type of the destination (host or network).

Serial Port Parameters

In the following section of the file, for ease of reading, the serial port number (from 1 to 4 or from 1 to 8) has been represented by the '%' character. In a real configuration file, the parameters for each serial port would, of course, be listed.

```
ch%_service_mode=server      (none | server | client)
ch%_service_type=telnet      (tty | telnet | lpdrcmd)
ch%_service_qname=aux1       (character string, 8 char max.)
ch%_service_tcpport=2048     (numeric)
ch%_associate_host=vangogh   (character string, 15 char max.
                             or IP address format)
ch%_associate_term=ansi      (character string, 15 char max.)
ch%_associate_idstring=      (yes | no)
ch%_associate_autoconn=yes   (yes | no)
ch%_associate_inactivity=    (numeric from 0 to 99)
ch%_associate_befprint=      (character string, 18 char max.)
ch%_associate_aftprint=      (character string, 18 char max.)
ch%_associate_crnlconv=      (yes | no)
ch%_associate_backup=        (yes | no)
ch%_backup_host=             (character string, 15 char max.
                             or IP address format)
ch%_backup_tcpport=          (numeric)
ch%_backup_timeout=          (numeric from 0 to 99)
```

```

ch%_backup_prioritary=      (yes | no)
ch%_line_type=direct        (direct | telecom | dedicated)
ch%_speed=38400             (300 | 600 | 1200 | 2400 | 4800
                             9600 | 19200 | 38400 | 57600
                             115200)
ch%_data                    (7-1-none | 7-1-odd | 7-1-even
                             8-1-none | 8-1-odd | 8-1-even
                             7-2-none | 7-2-odd | 7-2-even
                             8-2-none | 8-2-odd | 8-2-even)
ch%_fifo=dtr                (numeric from 1 to 16)
ch%_input_hdsk=dtr          (none | xon | xpc | rts | dtr)
ch%_iflow_passthru=         (yes | no)
ch%_output_hdsk=dtr         (none | xon | xpc | cts | dsr)
ch%_detect=dtr              (cts | dsr | soft)
ch%_hangup=dtr              (dtr | rts | soft)
ch%_do_hangup=              (yes | no)
ch%_do_netclose=            (yes | no)
ch%_hayes_escape=           (character string, 10 char max.)
ch%_hayes_hangup=           (character string, 10 char max.)
ch%_hayes_reset=            (character string, 20 char max.)
ch%_hayes_init=             (character string, 40 char max.)
ch%_phone_number=           (character string, 20 char max.)
ch%_modem_inactivity=       (numeric from 0 to 99)

```

Notes:

- If `ch%_line_type` is equal to `direct`, the last 9 parameters are commented out (except `ch%_do_netclose` if the device presence is enabled).
- If `ch%_hangup` is not equal to `soft`, then `ch%_hayes_escape` and `ch%_hayes_hangup` are commented out.
- Depending on the associated service, some parameters can be inactive. They are unmarked in the following table and commented out in the configuration file:

ch%_service_mode ch%_service_type	Available services				
	server			client	
	tty	telnet	lpdrcmd	tty	telnet
ch%_service_aname			✓		
ch%_service_tcpport	✓	✓		✓	✓
ch%_associate_host				✓	✓
ch%_associate_term					✓
ch%_associate_autoconn				✓	✓
ch%_associate_idstring				✓	
ch%_associate_inactivity				✓	✓
ch%_associate_befprint			✓		
ch%_associate_aftprint			✓		
ch%_associate_crnlconv			✓		
ch%_associate_keepalive	✓	✓	✓	✓	✓
ch%_associate_backup				✓	✓
ch%_backup_xxx				✓	✓

Tunings

tun_setup_tcpport=4096 (numeric value)
tun_ping_changeip=yes (yes | no)

End of File

The configuration file must be ended with the following trailer label:

```
END_AX40x0_SETUP
```

If this trailer label is missing, and the configuration file is used to set-up an Office Server, the fatal error message `ERR 103` will be issued (in response to the `rsh` command) and the default factory set-up will be reloaded.

A.8 - KEEPALIVE FUNCTION

The keepalive is a mechanism that allows a TCP/IP device to regularly check its TCP/IP connection status.

A.8.1 - Why a Keepalive Function is Needed?

A TCP/IP device is not able to detect in real time a network problem (remote host down, cable problem, etc).

A network problem can only be detected when data is sent and the destination host acknowledgement is not received. In this case, when the acknowledgement is not received, the remote TCP/IP device is considered 'unreachable' and its associated resources are released. This release is performed few minutes after the data was sent.

A.8.2 - Example of Potential Issue

Take for example an Office Server channel, set as a telnet server with the DialOut/IP driver under Windows. The Windows host opens a connection to the Office Server in order to associate a Windows COM port the Office Server.

In the event of a (network) problem Windows will react and the DialOut/IP connection will be closed. But the disconnection request will not be received by the Office Server (the TCP/IP link is broken). A 'Zombie' connection is now associated with the Office Server channel. Even After the network problem has been repaired, further Window's connection requests will be refused by the Office Server (the channel is still associated with the zombie connection).

Note: the Office Server channel will be released, either on Office Server reboot or when data is sent to Windows (the network problem will be detected).

A.8.3 - Keepalive Mechanism

The principle of keepalive is the Office Server checks regularly the TCP/IP connection status. These automatic checks are performed when the TPC/IP connection is idle.

To check a connection, the Office Server performs the following operations:

- if the connection is idle during a certain delay (i.e. no incoming network frame), a 'keepalive probe' is sent by the Office Server,
- if no response is received after 4 seconds, another 'keepalive probe' is sent,
- if no response is received after 8 'keepalive probes', the device is considered to be 'unreachable' (the associated connection is closed and the channel is released).

When the TCP/IP device is unreachable, 32 seconds (8x4) are needed to detect the trouble and to release the channel.

A.8.4 - Enabling the Keepalive

When a network service is set (**[Serial Lines]→[Line X]→[Network Service]**), the **TCP Keepalive Timeout** parameter is requested. The options are:

- **0** (default value): keepalive is disabled.
- from **1** to **99**: keepalive is enabled. This number is the delay (in minutes) needed to release a channel associated with an unreachable host.

Example: the TCP Keepalive Timeout is set to 5. If the TCP/IP connection is idle during 4 minutes 28 seconds, the first 'keepalive probe' is sent:

- If the TCP/IP connection is still 'alive', the checking process is stopped.
- If the TCP/IP host is really unreachable, 32 seconds are needed to complete checking. So, after 5 minutes (4 minutes 28 seconds + 32 seconds) the channel is released.

A.8.5 - When Routers are Used

Under default settings (keepalive disabled), the Office Server is "silent" with TCP/IP inactivity. But with keepalive enabled a regular data flow is generated during TCP/IP inactivity. (The 'keepalive probes').

With ISDN routers (which automatically drop the phone line) this regularly data flow will prevent the router from hanging-up. In this scenario the keepalive can cause very expensive phone bills.

Note: some routers are able to intercept 'keepalive probes' and to simulate the TCP/IP device response. This function (keepalive spoofing) avoids extra data

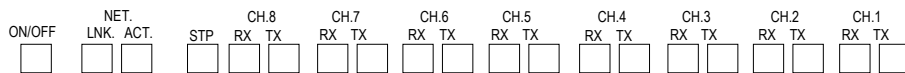
flow on the phone line. But the Office Server never detects a network incident on the remote site.

A.9 - OFFICE SERVER LED MEANINGS

The Office Server provides leds on the front panel. These leds show the Office Server's activity (network and serial ports) at a glance. They also signify special behaviour or errors.



AX4010 Leds



AX4020 Leds

Led meaning:

- **ON/OFF**: power indicator
- **LNK**: good link indicator. This led lights when the Ethernet connection is correct.
- **ACT**: network activity indicator. This led flashes to show the network activity.
- **conf.**: set-up indicator (AX4020 only). This led lights when the Office Server Set-Up is used (either by a dumb terminal or by a telnet session).
- **CH.x** (one per serial port):
 - **RX**: this led flashes when data is received
 - **TX**: this led flashes when data is transmitted (sent).

The 8 leds corresponding to the Ch1, Ch2, Ch3 and Ch4 serial ports are also used to indicate special processing or error conditions.

The three states of a led are:

led off: ☐

led lit: ☒


flashing led: ☐

Leds signify the various Office Server states as follows.

A.9.1 - Standard Processing





The standard behaviour of these 8 leds is to record serial port activity (see above). But for the two following event the led meanings are:

1 - No IP address is assigned to the Office Server





 : The 8 leds remain lighted until an IP address is set.

2 - The Office Server Set-Up is used: the 2 leds corresponding to the admin. Port remain lighted and flash to indicate the data traffic

A.9.2 - Specific Processing






    : bootp stage (getting information for downloading)

    : tftp stage

    : Download performed (led lights for 1 second)

    : RARP request (to get an IP address)

    : BOOTP request (to get an IP address)





 →  →  →  →  : Downloading in progress

A.9.3 - Errors





Note: after an error occurs, the Office Server should be power-cycled.

a) Network errors

    : Office Server Ethernet interface not responding

    : Other network problems

b) Bootp protocol error

    : No response to the bootp broadcast request (the bootp host is unreachable or not correctly set-up)

c) Tftp protocol errors

	: No response to the tftp broadcast request (the tftp host is unreachable or not correctly set-up)
	: File not found
	: Access violation (secure tftp or file access)
	: Disk full or allocation exceeded
	: Illegal TFTP operation
	: Unknown Transaction Identifier
	: File already exists
	: No such user
	: Other errors

d) Firmware File

	: The firmware file does not correspond to Office Server firmware
	: The firmware file size is less than 256 bytes. This indicates that the file is not an Office Server firmware
	: Checksum error on a file segment
	: Checksum error on the file

e) Flash Memory

	: Cannot erase the flash memory
	: Cannot program the flash memory
	: Cannot program the global descriptor

A.10 - ADMINISTRATION COMMAND LIST

The Office Server offers several administration commands. Using the rsh system command (available as standard features from most major operating systems) launches these commands.

The following table lists the available Office Server administration commands:

Command	Description
ax_reboot	Resetting the Office Server. Example: rsh axname ax_reboot [password] More information: chapter 3.2
ax_sinit	Resetting an Office Server serial port. Example: rsh axname ax_sinit [password] ch2 More information: chapter 3.3
setup_get	Requesting the Office Server Set-Up. Example: rsh axname setup_get > file More information: chapter 4.3
setup_send	Setting-up the Office Server through a text file. Example: rsh axname setup_send [password] < file More information: chapter 4.2
ax_download	Requesting an Office Server firmware downloading. Example: rsh axname ax_download [password] 192.1.1.1 file More information: chapter 6
ax_version	Requesting the Office Server firmware revision. Example: rsh axname ax_version
ax_getstat	Requesting the Office Server statistics. Example: rsh axname ax_getstat More information: chapter 3.5

Note: these commands are also available with uppercase characters (ax_version and AX_VERSION are the same command).

PERSONAL NOTES

A large, empty rectangular box with a thin black border, intended for personal notes. It occupies the majority of the page below the title.

AXEL

14 Avenue du Québec
Bât. K2 EVOLIC - BP 728
91962 Courtabœuf cedex - FRANCE
Tel.: 33 1.69.28.27.27 - Fax: 33 1.69.28.82.04 - Email: info@axel.com